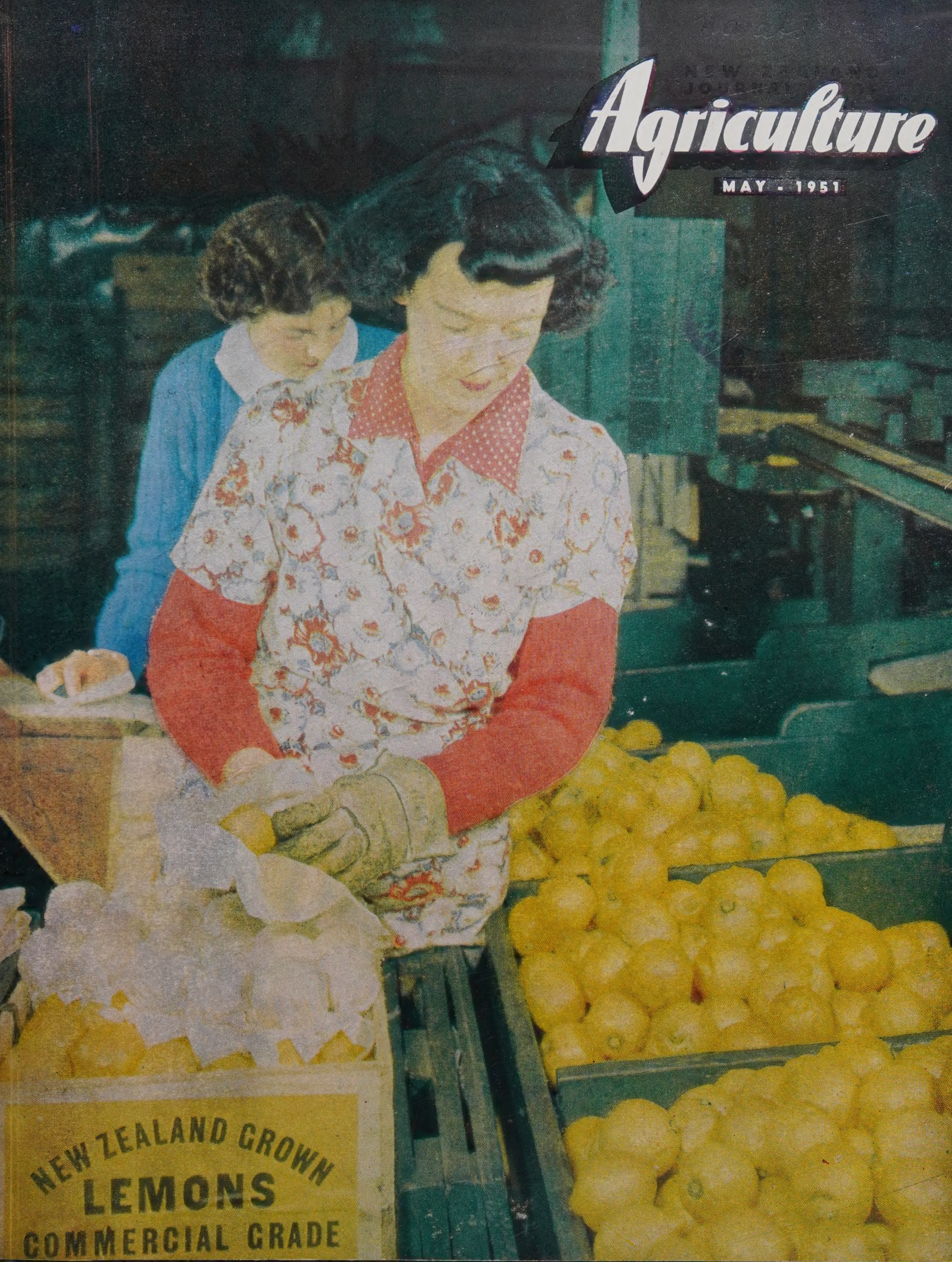
NEW ZEALAND JOURNAL OF

Agriculture

MAY - 1951



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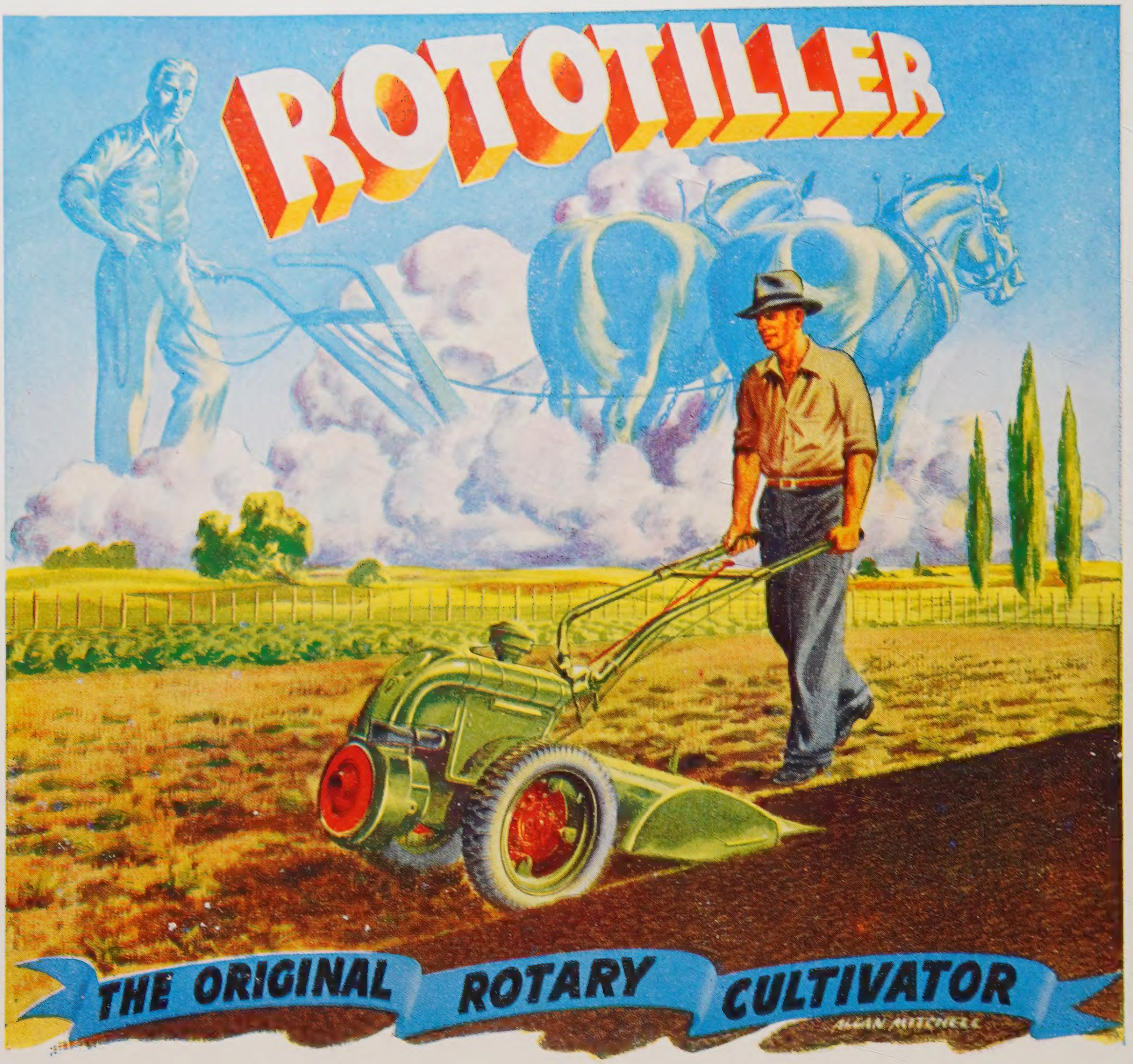

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BRANCHES AND AGENTS THROUGHOUT NEW ZEALAND

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This Month's Cover

Agriculture
LEMONS

Packing of lemons at the lemon processing and packing depot of the Marketing Department at Auckland is the subject of this month's cover, which has been reproduced from a colour photograph by Sparrow Industrial Pictures Ltd. Citrus orchards are confined almost entirely to the northern part of the North Island, because of the favourable climate there. In commercial orchards in 1950 there were 9500 trees in the Keriberi district, 19,000 in the Auckland district, 16,500 in the Tauranga district, and 3000 in the Gisborne district. Estimated production in 1950 was 139,000 bushels, of which 15,000 were produced in Keriberi, 35,000 in Auckland, 83,000 in Tauranga, and 6000 in Gisborne.

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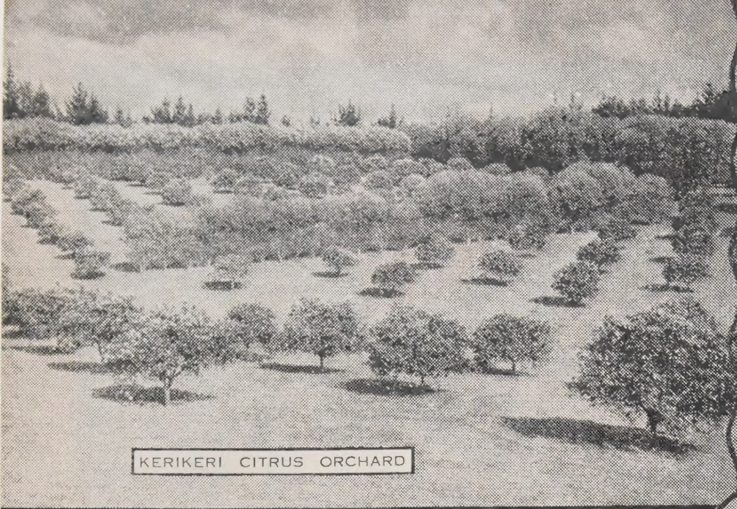
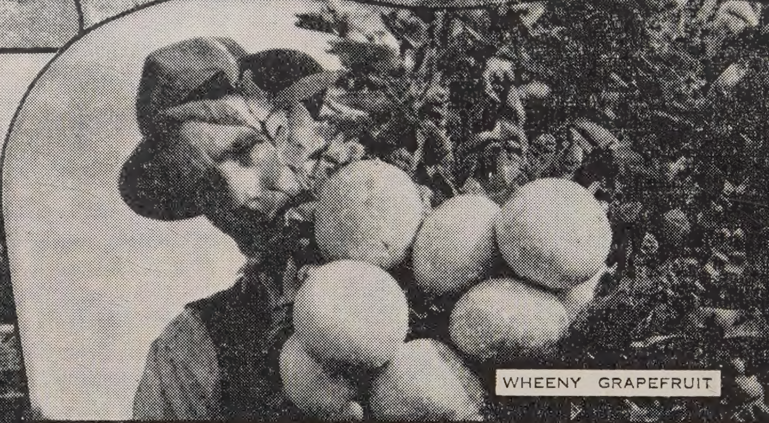

KERIKERI CITRUS ORCHARD

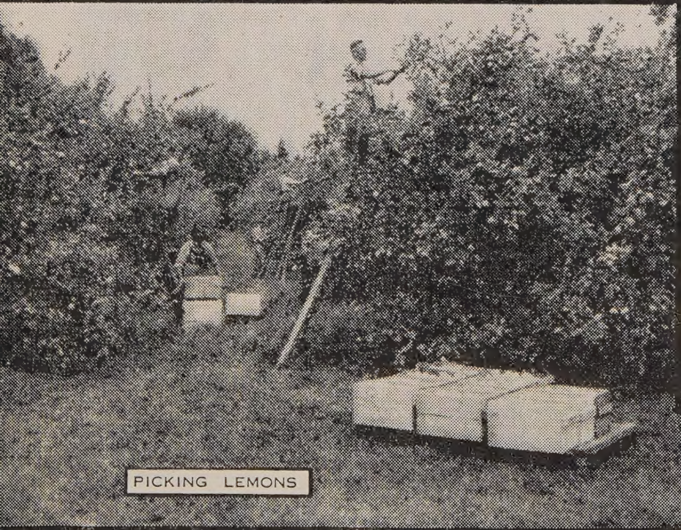
SPRAYING LEMON TREES

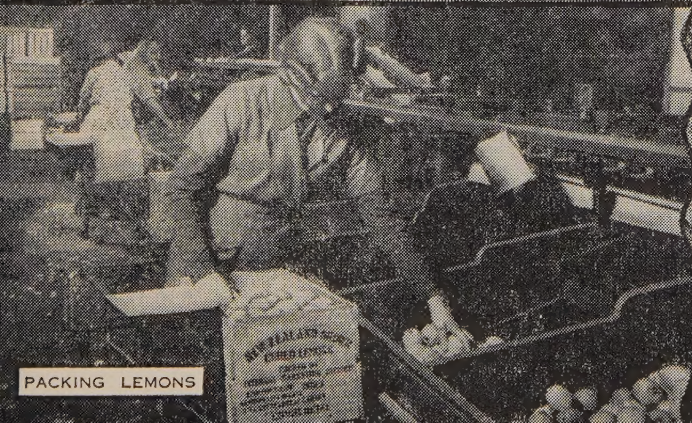
INTER-ROW CULTIVATION

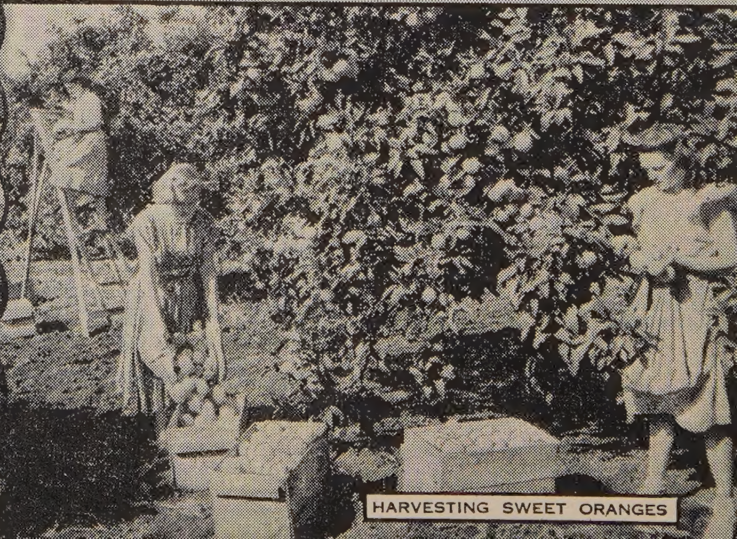

WHEENY GRAPEFRUIT

The citrus fruit industry of New Zealand is confined commercially to Northland, Auckland, the Bay of Plenty, and Gisborne. Lemons, grapefruit, and sweet oranges are grown extensively on small holdings and supply the larger proportion of the Dominion's requirements of this type of fruit. At the Kerikeri settlement about 55 miles north of Whangarei the orchard areas are small, the average size being under 5 acres, which is considered a full-time unit for one man. Tauranga and Te Puke fruit-growing areas in the Bay of Plenty are concerned principally with citrus fruit production; 95 per cent. of the fruit produced in the Bay of Plenty (excluding subtropical fruits) is citrus. In Auckland district it is estimated that the New Zealand Grapefruit crop will reach 120,000 bushels by 1954, and the Wheeny variety is likely to increase in popularity.

[Photographs by National Publicity Studios, Rendall's Photo Service, and Sparrow Industrial Pictures Ltd.


PICKING LEMONS


PACKING LEMONS


HARVESTING SWEET ORANGES

APPRENTICES FOR AGRICULTURE

I RETURNED from the official opening of the new Boys' Training Farm at Putaruru recently with deep and mixed impressions. One of my most persistent thoughts was of the somewhat haphazard methods of recruitment of young people to what has always been and as far as one can foresee will continue to be our greatest and most important industry. Other trades, professions, and industries have long since realised the necessity for organised and standardised periods and methods of training as a preliminary to qualification to practise in the chosen calling. Trial and error over the years have eventually moulded for most industries today an apprenticeship system that has ensured at most times the recruitment of the necessary inflow of new strength and skill to maintain economic and efficient operation.

Even those organisations with long experience in the apprenticeship field are today having to compete keenly for trainees; without such schemes various of the skilled occupations would have been in a chaotic state.

To say that the agricultural industry is ill equipped to compete for young brains and labour in the highly competitive labour market of today is not to cast any reflection on some of the really magnificent farm training schemes that have been established. These have done excellent work in a small compass, but have never been on a scale to assure the future of the whole industry. Their operations and results, however, offer many lessons if and when a more effective scheme for the whole industry were to be considered, as I think it will have to be.

Improved social and transport amenities for the past few decades have effected a social and mental homogeneity of country and town communities and the isolation of most of our country life has been broken down. There was a tendency at one time for the "dull" boy of a rural family to be regarded as the automatic choice to succeed to the mud of the cowbail and the following of the plough, while his brighter brothers and sisters were given whatever opportunities the family income offered for positions in the commercial and professional world of the cities. Today the dull boy is subjected in his own home to many of the influences of the outside world and there is an increasing tendency for him to be drawn off the farm into other walks of life. The realisation that farming today requires the same resources of skill and intellect as any other profession has not been met by a sufficient effort to ensure the recruitment of these qualities to the industry.

The urban drift will always be a problem to be reckoned with in an essentially agricultural country, and there are several ways of combating it. All must be exploited if our economic well-being is to be assured.

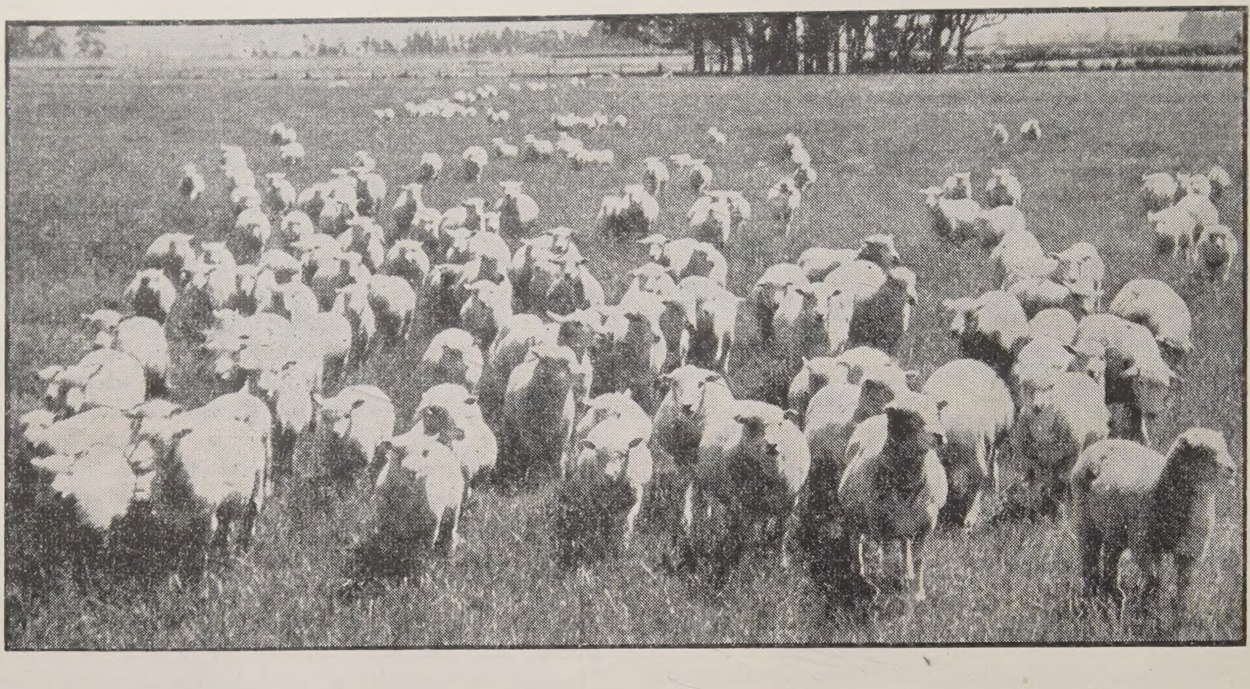
The provision of housing and social amenities equal to those in urban communities has received urgent consideration by the standing advisory committee on production established by the Government. Several Government Departments are providing services to rural communities that are lifting their standards to a plane comparable with that of the cities. Rural sociologists, district nurses, housekeepers, country library services, Young Farmers' Clubs and Country Girls' Associations, etc., are doing much to increase the attractiveness of rural living.

On the other hand there are many potential young farmers raised in urban families whose urge to adopt farming as a career is thwarted by lack of opportunity. I believe that this potential will increase. Social studies and the wide circulation in schools of the "Journal of Agriculture" are bringing to young minds an appreciation of the place and importance in our economy of the agricultural industries. Appetite grows by what it feeds on and I believe that the best interests of our primary production industry will be served by a wholehearted attempt by the industry to ensure adequate encouragement to and opportunities for adoption of farming as a way of life.

The establishment of Flock House as an acknowledgment of debt to British seamen by New Zealand sheep owners; of Smedley Station by Hawkes Bay graziers, and of the Wairarapa Training Farm by the farming community of the district is an example of industry action in the direction I have indicated. The Department of Agriculture has given every assistance to such institutions with representatives on management and advisory committees, the provision of lecturers in agricultural courses, and the encouragement of the introduction of Young Farmers' Clubs activities and courses. That the work of farm training institutions is valued is evident from the long waiting lists of applicants for enrolment and the keen demand for trainees on the completion of their courses. Outstanding successes have also been achieved at secondary schools specialising in agricultural courses.

The success of local efforts and their inadequacy to cope with demand for the training they offer show that a widespread effort would go a long way toward solving the problem of recruitment to agricultural pursuits. The Department is already active in the support of established organisations and this support would continue to be given to any wider scheme. Investigation of the problem and formulation of an adequate answer would be fruitful activities for organisations within the industry itself.

K. J. HOLYOAKE, Minister of Agriculture.



HEADING PHOTOGRAPH: Heavy stocking with sheep is one of the essential factors in the method of farming described. This paddock will be sown to cereals in the next year.

Intensive Mixed Farming on a Mid-Canterbury Farm

By C. P. WHATMAN, Instructor in Agriculture, Department of Agriculture, Ashburton

HEAVY stocking can be combined with the production of small-seed crops to the advantage of farmers' net returns. This is well illustrated by Mr. C. A. B. Pilbrow, Coldstream, Ashburton, who on land and under climatic conditions which are far from ideal, is achieving a per acre production which would be highly creditable on much more favourably situated properties. The type of management under which this is done has points of interest which could well be applied on many other farms. The use of lucerne and lucerne hay to adjust feed supply to stock requirement throughout the year is the key to production.

AT the south-eastern extremity of the Ashburton County, near the mouth of the Rangitata River, is an area of Templeton silt loam which was cut up into farms of about 200 acres after the First World War. Although of fairly high initial fertility, the soil suffers from the occurrence through it of light shingle strips, and management is complicated by the low rainfall, averaging 22in. per annum, and the high summer evaporation, a normal state in Mid-Canterbury. On these comparatively small farms cash cropping is naturally the major activity, with livestock playing a very small part.

Greater attention is being paid to small-seeds production, and the harvesting of Certified seeds provided these farmers with an alternative cash crop. At the same time heavier stocking became necessary for the adequate control of pastures, and improved grass and clover strains proved considerably more reliable. By the use of more livestock and with better pasture and decreased cropping with cereal crops, a better balance was obtained of crops to livestock and of fertility building to exhaustive processes.

High Carrying Capacity

High carrying capacity is strikingly shown on the farm of Mr. Pilbrow. In 1943, with rehabilitation assistance, he took over a farm of 180 acres to put into practice ideas he had on small-seeds production. The farm was then in poor shape, fertility being definitely depleted. Good husbandry has built it up until today he is carrying, on land which is only of medium quality, 400 ewes as well as growing 20 to 30 acres of cereals and harvesting 40 to 50 acres of grass and clover seed. In addition, from 100 to 200 hoggets are wintered, and if the season is favourable, 100 ewe hoggets are carried forward for flock replacements. Otherwise all hoggets are shorn and disposed of as fats or forward stores as opportunity offers. The sheep, although profitable in themselves, may be looked on mainly as a means of pasture control and as fertility builders to enable the small-seeds crops to be taken. Every acre of the 180 acres must play its part in production and on January 1 of a normal year the utilisation of the area is somewhat as follows:—

	Acres
Fallow	12
Peas or wheat	25
Lucerne	20
Ryegrass seed crop	30
White clover seed crop	12
Cocksfoot seed crop	10
Area of old grass available for grazing	71
Total	180

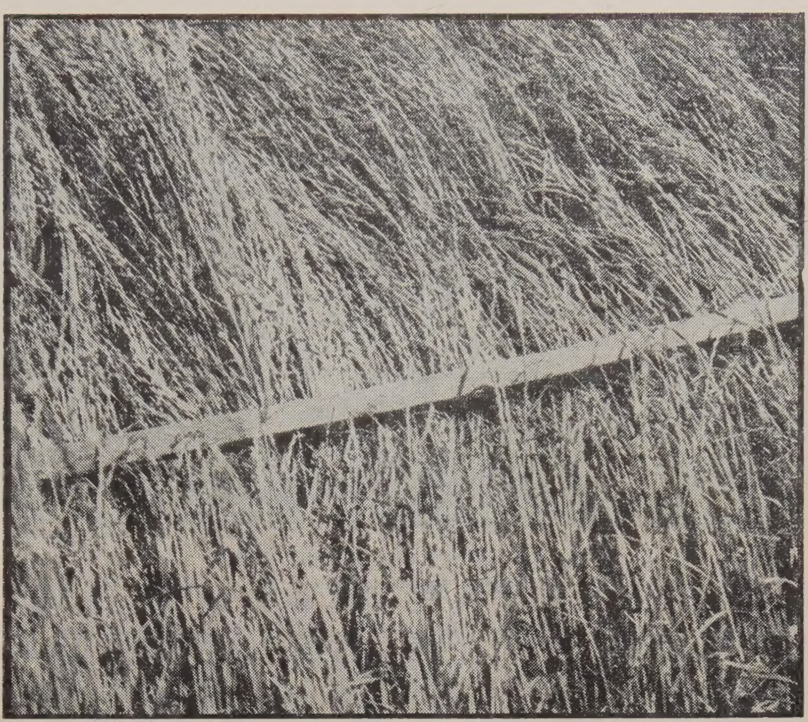
The main problem in the management is to ensure that the small area of grazing pasture (71 acres) will carry the 400 ewes, their lambs, and 100 hoggets during a period of the year when growth is likely to stop owing to dry weather. It is the lucerne stand which solves this problem, and details of the way in which it is used will be given later under the heading "Sheep Management".

Cropping Programme

At the beginning of the new year it is decided on age and appearance which paddock is to be broken up for crop that autumn. This is the time when pasture for grazing is limited and growth is frequently negligible. At the same time the ewes require a maintenance ration only. They are crowded on to the paddock to be broken up for wheat or peas—standing room only is the rule—and are fed on lucerne hay. For the month or 6 weeks that the ewes remain in this paddock, the heavy stocking of

20 to 40 per acre builds up fertility which is largely responsible for the excellent crops of peas and cereals that are harvested. Occasionally a further crop will be taken out of this paddock the following year, but this will depend on factors such as fertility of the paddock and prevalence of grass-grub damage in pastures.

Grass is sown in autumn, part of it immediately after the cash crop, and the remainder following a short fallow. Both perennial ryegrass and short-rotation ryegrass are grown, part of the farm being reserved for one and part for the other. Short-rotation ryegrass is used, partly on account of the bulk of feed produced in the first winter and the good seed yield in the first harvest, and partly on account of the suitability of the grass as a nurse crop for the white clover, which yields well in the second harvest. Either Certified Government Stock or Certified Pedigree seed is sown; a desirable practice where maximum use of the area is to be made for seed production. In general, paddocks will be grazed for a third and fourth year, but attacks by grass-grub and porina (*Oxycanus*) may make the ploughing up of the paddock necessary after the white clover crop, in which case it will be resown to grass immediately. Half an acre of mangolds provides a valuable reserve in wet weather and a supplement to hay feeding before spring growth begins.



Portion of a field of short-rotation ryegrass which was heavily stocked with sheep fed on hay before being sown to the preceding crop, peas.

Sheep Management

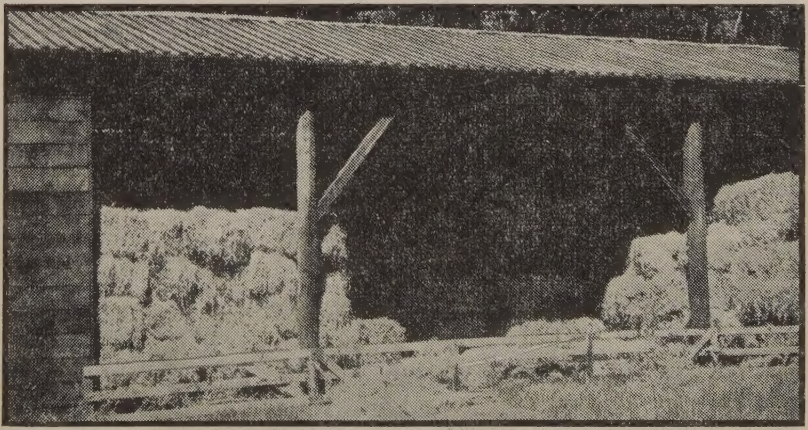
Lambing begins not later than August 10 in order that a draft of fat lambs can be taken (usually 60 to 70 per cent.) before Christmas. At lambing, ewes are drafted for short periods on to the lucerne, which at this time is usually making good growth on this early country. This enables certain of the older pastures to be spelled, and with this treatment the response to spring rains is phenomenal. Grazing at this time does not harm the lucerne, and after lambing is finished growth on the pastures is such that the lucerne can be shut up for the first cut.

Seed-producing pastures are shut up about the first week of October for grass seed and mid-November for clover, and it has been found that the 400 ewes and their lambs can be carried on about 40 acres of grass until the first draft is taken. If pastures have been damaged by grub or if the season is very unfavourable, half the lucerne area will be grazed after the first cut has been taken. The balance will be cut for hay, except for an area of 3 or 4 acres which is set aside and on to which lambs will be weaned. Weaning takes place before Christmas and usually there will be fewer than 200 lambs to be fattened on lucerne and lucerne hay. It has been found that they fatten extremely well on this feed. No attempt is made to get heavy weights, the important thing being to have all the lambs off the farm as early as possible in the new year. About 100 ewes are culled at weaning and 75 per cent. usually go straight to the works. The balance, 20 or 30, are fattened on any available grass or lucerne.

The ewe flock is then run, as was stated earlier, on the paddock which is next to be broken up. Lucerne hay and headed grass straw are fed out and the ewes remain there until feed becomes plentiful again and they can be put on the aftermath of the small-seeds crops and other grass paddocks. If the weather is very dry, feeding of hay is continued. One hundred ewe lambs and 100 wether lambs are bought, the ewe lambs for ewe replacements and the wether lambs to be fattened on hay during winter.

In May the ewes are run in one mob on the older paddocks (never on newly sown grass). The mob is rotated round 4 or 5 paddocks, spending about a week in each. Pasture pickings are supplemented by lucerne hay. Heavy stocking (30 to 40 per acre) builds up fertility and this, probably assisted by the hard grazing, helps to control the growth of goosegrass.

Through June and July some grazing is done on the new grass (the following year's seed crop). No more than an hour per day is allowed, and the aim is the control of growth rather than ideal grazing for the sheep. With hay, pickings from older paddocks, and early grazing of the young grass, ewes come through the winter and to



The first cut of hay. Plentiful supplies of lucerne hay are essential if sufficient stock is to be carried to build up fertility for cash crops and subsequent sowing to small seeds.

The cocksfoot stand. On the left is the stand sown in 28in. rows. It was cultivated only during the first year after sowing. On the right is the same stand, now in its sixth year and carrying a heavy seed crop.

lambing in remarkably good condition.

Topdressing Programme

A satisfactory lime status is naturally essential to production such as is obtained on this farm. Each paddock has now had 3 tons of lime per acre during the last 7 years, and lime is still applied at 1 ton per acre during the first 12 months of a new pasture. Superphosphate dressings have been increased and the usual practice is the application of 2cwt. of superphosphate at sowing and a topdressing of 2cwt. each year, applied in autumn, and occasionally a further 2cwt. in spring. Artificial nitrogen has not been applied up till now, with the exception of 2cwt. of sulphate of ammonia applied annually to the permanent cocksfoot stand, which is sown in 28in. rows and is not used for grazing.

A soil profile typical of the lighter part of the farm where lucerne is sown for grazing.

Pastures are very subject to ravages by pests. The use of "Gammexane" superphosphate for topdressing is standard practice. This is applied after harvest and before deterioration of the pasture becomes noticeable, and deals fairly effectively with the porina (*Oxycanus*) problem, but still leaves the pasture liable to be eaten out by grass-grub. Mr. Pilbrow, however, is confident that this problem will be overcome, and when this occurs it will enable him to make his rotation much more stable. At present one of his major costs is the renewal of pastures before they are due to be broken up because they have been eaten out by grub.

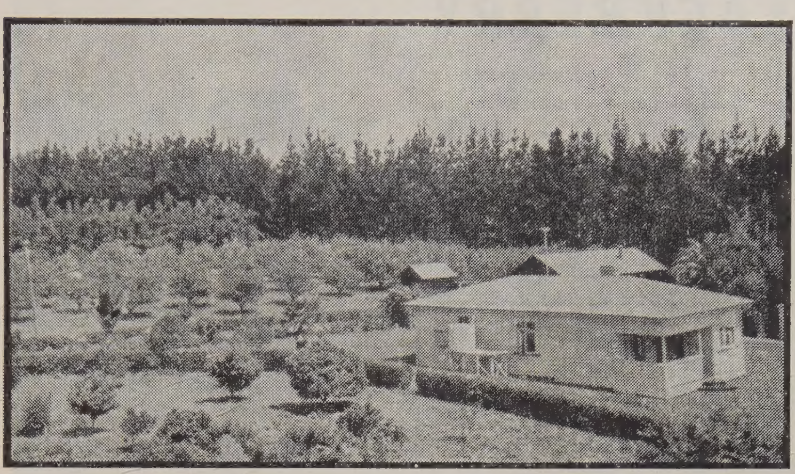
It will be seen that the lucerne area is the key to the whole system of management. Though it is grown on the poorer, more shingly part of the farm, it provides a stable production which is used to even out the flush of growth of the other pastures. Summarising the part lucerne plays, it is found that it provides hay for winter feed, lambing feed, supplementary grazing for ewes and lambs during late November and early December if necessary, and grazing for fattening the balance of lambs after weaning.

It is not suggested that many farmers could follow Mr. Pilbrow's system of management in its entirety. Each farm has its own problems, and a programme must be devised to satisfy the requirements of a particular farm. At the same time it would be possible to apply some of the principles of his method of management to a large number of Canterbury farms, with vastly increased and more diversified production, and, what is even more important to the farmer, increased net returns.

◆

A LEMON ORCHARD NEAR AUCKLAND

THE development and operation of a lemon orchard, the property of Mr. H. H. Booth, Te Atatu, in the Henderson district near Auckland, is the subject of this article by I. L. Nottage, Horticultural Superintendent, Department of Agriculture, Auckland. Mr. Booth is one of the very few New Zealand fruit growers who depend entirely for a livelihood on the production of lemons, as apart from a small domestic block of miscellaneous trees his orchard is devoted to lemon culture. A number of larger citrus orchards are to be found in the Auckland Province, but most of them include substantial numbers of other kinds of fruit trees.



The house, sheds, and part of block 3 on Mr. Booth's orchard. Note the intermediate shelter of bamboo at left beyond lemon trees.

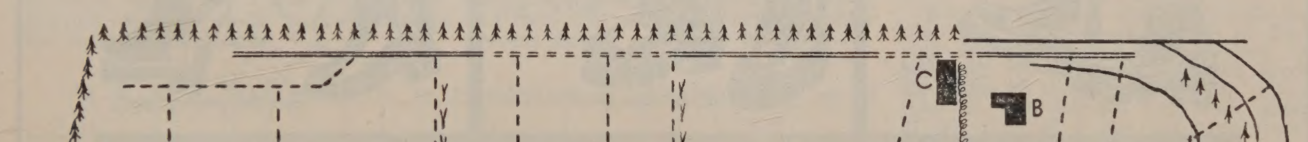
IN 1920 Mr. Booth, assisted by the servicemen's rehabilitation scheme, purchased the property he still owns, though at that time it was a dilapidated poultry farm, which he spent the next 2 years developing and modernising. However, the economic slump of 1922 put an end to this undertaking and he sold the poultry and cast about for some other way to use the 8¾ acres of land, most of which was in scrub and poor grass. In the meantime he took a job 12 miles from the property.

Starting with a debt of £80, with no knowledge whatever of fruit growing, and with practically no equipment Mr. Booth took the advice of a neighbouring fruit grower, Mr. R. H. Roberts, and determined to develop his property as a lemon orchard. From Mr. Roberts he purchased the trees in a small nursery containing some hundreds of island sweet orange seedlings suitable for citrus tree stocks. These he cultivated and tended until they were ready for budding, using buds from Mr. Roberts's trees. There was some doubt as to whether the stock he used was Messina, a variety seldom grown in New Zealand, or Lisbon, but whatever it was, it has proved to be a good variety. At this time a start had been made getting the land ready for the day when the nursery trees would be big enough to plant. Caring for the small nursery was a minor task compared with the work of clearing, fencing, and draining the orchard land.

In 1922 the long narrow section was covered chiefly with secondary scrub growth, was unfenced, and was entirely unsheltered. The soil was gumland, a heavy clay subsoil with a thin layer of topsoil, except for block 4, where the topsoil was deeper and lighter in texture. Fortunately, the site was good, with a gentle slope facing north-east, and ending in a sudden drop of some 30ft. to the mangrove-fringed tidal flat of the Whau Estuary. Because of the nature of the soil, careful drainage was essential. Considerable sums of money had to be found to cover the cost of field tiles, fencing materials, and eventually the cost of ploughing and cultivating, and liming and manuring before the young trees could be planted.

Mr. Booth spent the remaining hours of daylight after he had returned from work on his new project as well as night hours. He strapped a bicycle lamp to his waist at night and dug drains in preparation for laying field tiles.

That the drainage plan was well conceived is still evident, for very few of the trees have ever shown



Plan of orchard. Tile drains are shown by dotted lines and open drains by parallel lines. The figures show the blocks into which the property is divided. A—Homestead. B—Cottage. C—Manure shed. D—Main shed. E—Spray unit shed. F—Fruit loading shed.

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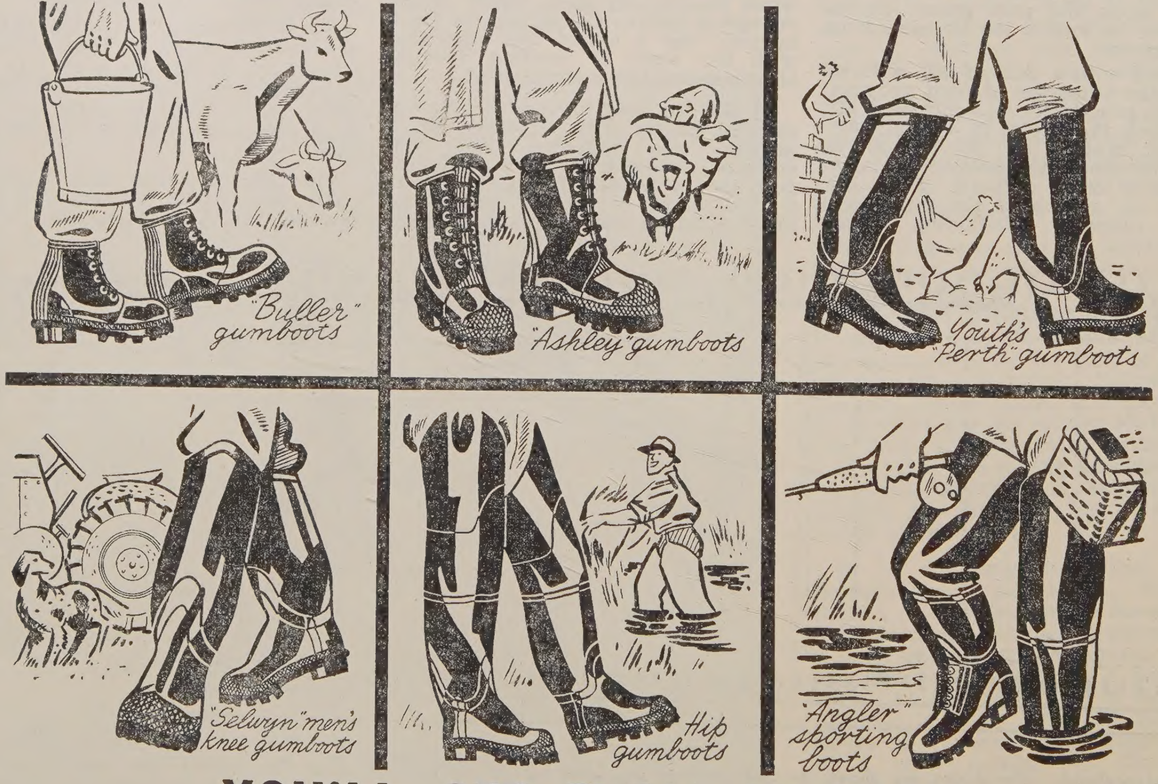
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signs of "wet feet", despite the difficult nature of the clayey gumland. This is an example of the good results obtained from careful planning and laying of drains before planting the trees.

The plan of the orchard on page 391 shows how lateral drains were run across the slope of the land into main drains or out to the roadside drains. Some of the drains running parallel with the shelter trees are now kept open, because roots completely blocked the original tiles.

By the time the nursery stocks were ready for budding, Mr. Booth had learnt that the point of union between stock and scion is the Achilles' heel of a citrus tree. To keep that weak spot as far as possible from ground level and chance injury by implements or surface water all of the trees were budded unusually high; approximately 18in. from the ground. It took a year longer to grow the stocks but that delay has never been regretted.

Planting

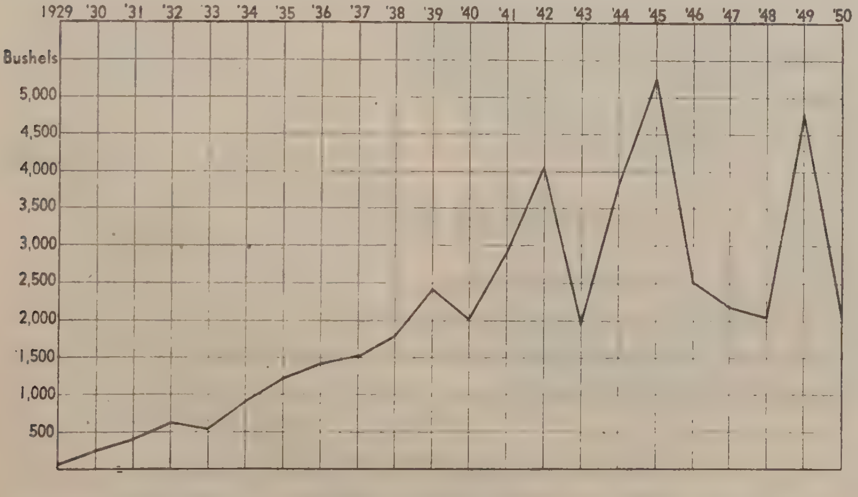
The trees in blocks 1, 2, and 3 are 20ft. apart, planted on the square system, but in block 4 the planting is slightly off-square and the trees are 24ft. apart. Mr. Booth regrets now that he did not plant all of the trees 24ft. apart, because the first two blocks are now very crowded, and only the fact that trifoliata stocks have a somewhat dwarfing effect has saved the trees in block 3 from the same fate.

It was not until 1925 that block 1, on the highest part of the property, was planted up with 250 lemon trees.

Having in mind the moisture-retentive nature of the clay subsoil and the generous rainfall in the district, Mr. Booth wisely decided not to depend entirely on the effectiveness of his newly laid tile drains. He had the land ploughed into low ridges, coinciding with the proposed tree rows, and by this action the depth of topsoil along the rows was doubled, the young roots could develop above the clay subsoil for at least a year or so, and surface drainage was vastly improved by the continuous shallow depressions between the rows. The trees were planted as shallow as possible along the tops of the ridges.

A view from the orchard, overlooking the mangrove-fringed Whau Estuary where it joins the Waitemata Harbour.

Although the fact that the land had a north-easterly slope was its only protection from prevailing cool winds, Mr. Booth was unable to plant shelter trees until 1925, when the first fruit trees were set out. That year, single-row shelters of *Pinus radiata* were planted round the boundaries of the property. At the same time temporary intermediate breaks of the quick-growing *Albizzia lopantha* were planted and were of inestimable value for a few years, although they were not suitable as permanent shelter. Those short-lived trees were replaced in 1932 and 1936 with bamboo (*Bambusa vulgaris*) hedges which have served admirably as permanent intermediate breaks. The bamboo hedges made little growth for the first 2 years, and then shot up very quickly to their present height of about 20ft.



Lemon production from Mr. Booth's orchard from 1929, when the first few bushels were marketed.

The *Pinus radiata* boundary shelters are now 40ft. to 50ft. high, except along the less exposed road frontage, where they have been topped at about 25ft.

Blocks 2 and 4 and a corner of block 3 were planted in 1927 with trees budded by Mr. Booth.

Block 3 was not planted until 2 or 3 years later when 100 *Poncirus trifoliata* stocks had been purchased and budded.

Block 5 is a home orchard of miscellaneous fruit trees, including several varieties of sweet oranges and mandarins.

Cultivation and Manuring

When the land was prepared for planting, 1 ton of carbonate of lime was broadcast, and applications of 5cwt. to 10cwt. per acre were given for each of the next 5 years. From then on the orchard has been limed at the rate of 1 ton per acre every third year.

Blue lupins were sown as a cover crop and were ploughed under each spring until the trees grew large and shaded the ground too much for the lupins to thrive. About 3cwt. of superphosphate per acre was broadcast each year when the lupins were sown in autumn.

For the first few years the orchard received from 3cwt. to 5cwt. of superphosphate per acre, but subsequently Mr. Booth has used no phosphates except comparatively light dressings sown with the cover crops; these were discontinued when the cover crops could no longer be grown.

When poultry manure has been available each tree has received an annual quota of a sackful, applied preferably in autumn. In years when poultry manure could not be obtained, sulphate of ammonia was used as a substitute at 8lb. to 10lb. to each tree.

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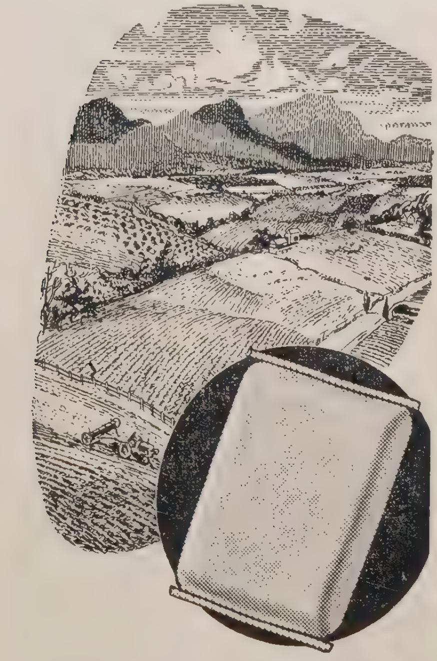

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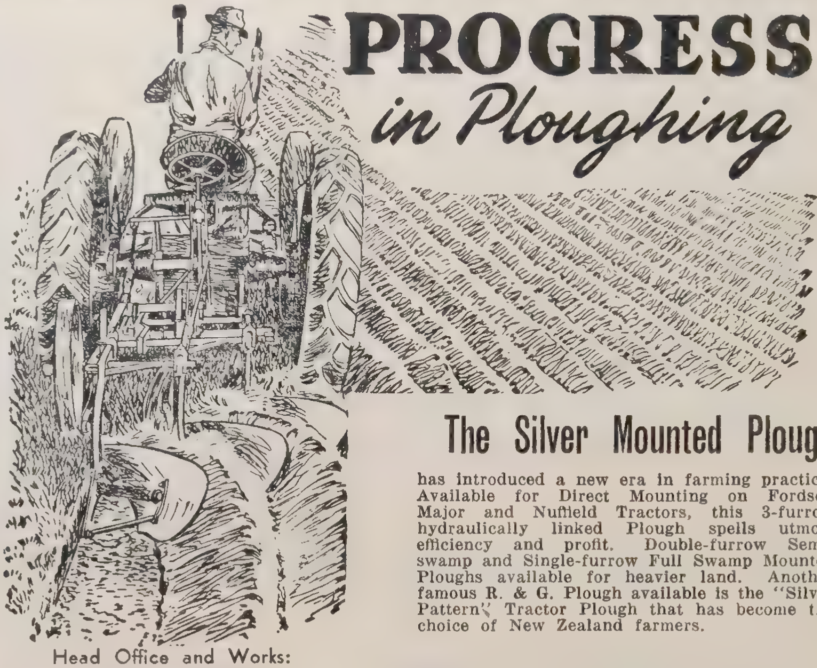

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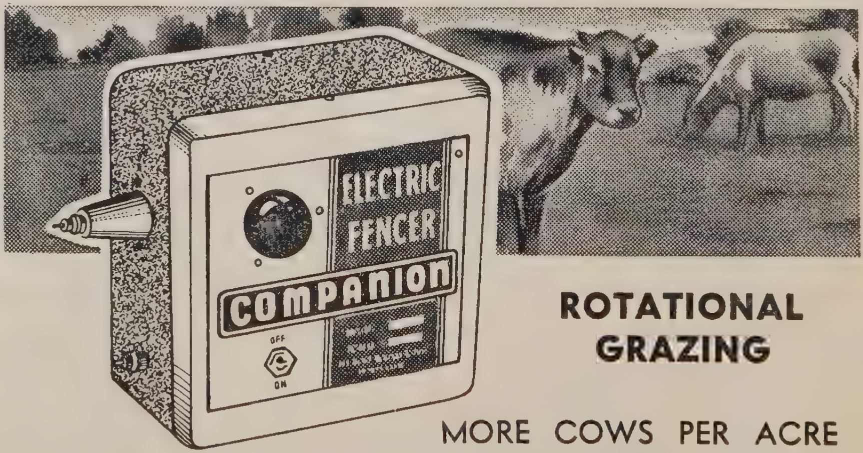

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Mr. Booth has always dug fairly deeply round the trees at least once a year after the manure has been distributed in a circle about each tree.

All cultivation, apart from digging round the trees, was done by contractors until 1934, when a rotary hoe was purchased. From then on only the annual spring ploughing was done by contract. The same machine is still being used, although it is doubtful if many of the original parts still remain. The 5 h.p. hoe can still be used easily between the more widely spaced trees of block 4, and in block 3, where the trees on *Poncirus trifoliata* stocks are smaller, but in the two other blocks there is little land left uncovered by the large lemon trees.

Since the trees have become very large the first spring cultivation has been done with a large rotary hoe instead of by ploughing.

Pruning

Comparatively little pruning was done in the earlier years, but in 1938 the whole orchard was pruned according to the so-called "Cacciopoli system", which was very drastic, but served to improve the main frameworks of the trees. That system was much too severe to be continued, but a moderate amount of pruning has been done each year since then.

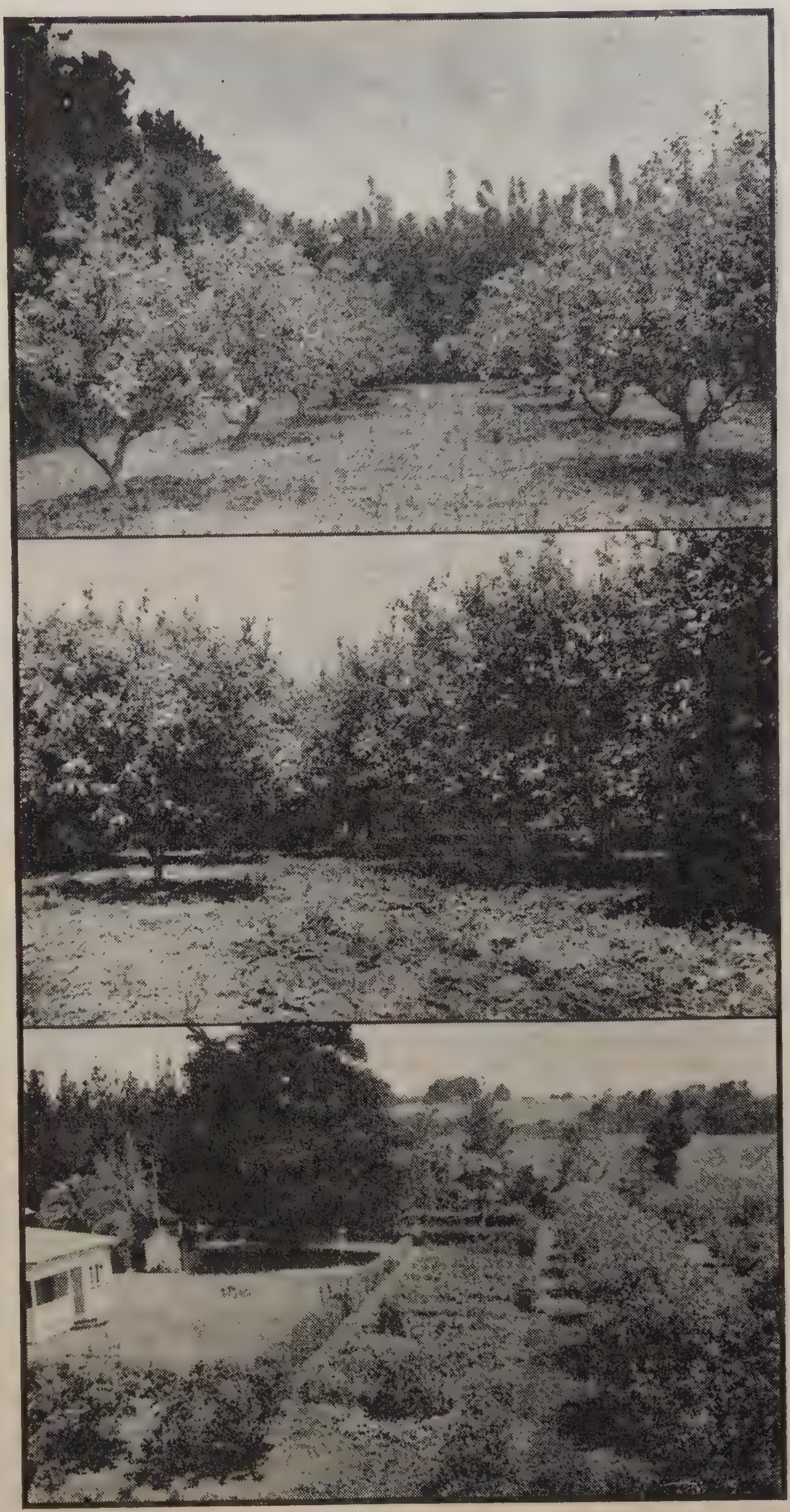
Mr. Booth does all the pruning himself, and aims to produce strong, healthy fruiting wood by removing worn-out or diseased branches, and also to restrict the sizes of the trees to some extent by shortening excessively long growths. As far as possible he keeps all branches well clear of the ground, but not so high that he loses too much fruit by removal of valuable, lower side branches. Mr. Booth considers that pruning should receive more attention, and that the work would be well repaid by increased production, but like many other growers, he seldom has time to do everything just as well as he would like.

In all, the orchard contains about 560 producing trees, excluding those in the small mixed block, which are not essentially commercial, although some fruit is marketed from them.

Development of the orchard from the time the trees were planted was remarkably uneventful. An exceptionally violent storm early in 1936 brought down about 50 trees, and did a certain amount of damage to considerably more, but repairs were effected quickly and very soon the orchard was back to normal.

The trees on *Poncirus trifoliata* stocks, in block 3, have been disappointing. Not only are they smaller than the others, as was to be expected, but they have proved unthrifty and lacking in vigour, and have never been very productive. There is now some evidence that they are not receiving sufficient phosphorus, and it may be that trees on *P. trifoliata* stocks need more of that element than do those on island sweet orange seedling stocks. At all events, those on the latter stocks have retained their vigour and productiveness, whereas the trees in block 3 have been far from satisfactory.

A few trees have been lost as a result of the depredations of borers,



Upper—Part of block 3. The lemon trees on *Poncirus trifoliata* stocks shown here are rather sparsely foliated. Middle—Lemon trees on island sweet orange stocks planted in 1927-28 and now crowded. The tree on the left is a younger replacement. Lower—The garden, small nursery, and part of block 4.

Part of block 1. Trees on island sweet orange stocks, planted in 1925, are meeting between 20ft. wide rows.

aided by bark diseases, but very few have suffered from either "collar rot" or "wet feet", both of which could have been very troublesome had Mr. Booth's initial preparation of the land been less carefully planned.

Some of the losses have been replaced by planting New Zealand Grapefruit, young lemon trees have filled in a few more gaps, and at present there are some vacant places to be refilled. A small number of the older trees will require replacing within the next year or two, and it can be expected that losses will continue, for the lemon trees are nearly all 20 to 25 years old. Most of the trees have many more years of useful life ahead of them, but in the New Zealand climate gradual replacement of the trees in a lemon orchard becomes necessary at about this stage.

The graph on page 393 shows the various stages of development of the orchard and gives approximate production figures (in loose bushels). From 1929, when the first few lemons were marketed, until 1939, no accurate records are available, but crops increased approximately as indicated, although there were seasonal variations which cannot be recorded. The graph is compiled from actual figures of lemon production from the year ending March 31, 1940, until 1950.

In the year of highest yield, 1944-45, production averaged about 10 loose bushels per tree, while the average for the last 10 years has been approximately 5¾ loose bushels of lemons.

Since May, 1939, the curing, packing, and marketing of lemons have been handled by the Marketing Department, under a scheme which provides a guaranteed price to the growers for their lemons.

It will be noticed that annual production has fluctuated to a marked extent. Until the 1944-45 season the yields from the orchard tended to follow a 3-year cycle of low, medium, and high crops, a cycle which was reflected also in average production in the lemon-growing districts as a whole. However, from 1946 to 1948 the pattern was altered, greatly to the detriment of the producers, for instead of rising steeply the yields became steadily smaller. This feature also is duplicated in average district yields, and can be attributed to unfavourable climatic conditions in the seasons concerned. The marked improvement shown in the following season came none too soon.

Improvement of Property

About 6½ acres of the property are now carrying productive fruit trees. The whole area is carefully drained and effectively protected from winds by well-placed rows of shelter trees.

Contractors are still employed for ploughing and heavy cultivation when that is necessary, but most of the work is now done by the small rotary hoe. An old but still serviceable tractor draws a trailer used to haul fruit and fertilisers on the orchard.

For 10 years spraying was done with the aid of a hand-powered barrel pump drawn by a horse, but in 1935 the orchard was equipped with a stationary spray plant connected to a reticulation system comprising ¾in. piping up the centre of the orchard, with ½in. laterals leading to hose standards at suitable points.

The cottage has been remodelled and increased in size, while ample shed space has been added from time to time. A cottage is available for a married permanent hand on the orchard. Although often it has been difficult to find an experienced assistant, or a man who would stay long enough to become experienced, the cottage has been a valuable asset from that point of view, for without accommodation the labour problem undoubtedly would have been even more difficult.

◆

BOOK REVIEW

"The Australian Wool Industry": H. Munz

IN his foreword to this book Dr. Clunies Ross remarks that it fills a long-felt want in Australia, where there has been a remarkable lack of books dealing with this great industry. The sheep and wool industry in New Zealand has been no better served in this respect, and though Mr. Munz's book deals primarily with Australia, there is much in it which New Zealand sheep and wool men will find of interest and even of value.

Though the chapters dealing with the early history of the Merino, its introduction and evolution in Australia, the climate and geography of the country, the present distribution and size of flocks, and life on an Australian sheep station are of passing interest, there are other sections of the book which are just as applicable to the industry in New Zealand as to Australia and which are of vital concern to wool growers in this country. The nature of the wool follicle, the physical and chemical properties of wool, the principles of wool classing, wool compared with other textile fibres, wool research, and a glossary of terms are subjects of international scope.

An illustrated description of British breeds of sheep in Australia, crossbreeding with the Merino, and the classing and marketing of Merino wool are other chapters which should prove interesting to readers in New Zealand. There is no padding in this book, and the author has covered much ground in a volume of limited size which also includes many instructive illustrations.

—*J.E.D.*

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◆

Requirements of Fruit-tree Grading Regulations

BECAUSE it considers the Regulations are not as widely known as they should be, the Horticulture Division reminds nurserymen that they have obligations to buyers of fruit trees under the Fruit-tree Grading Regulations 1945, which came into force on March 1, 1946, except that citrus trees were not brought within the scope of the Regulations until April 1, 1950.

Every occupier of a nursery is required to grade fruit trees, with certain exceptions, into one of three standard grades and to supply certain information to the buyer with the invoice. Copies of the Regulations (serial number 1945/189) may be obtained from the Government Printer, Wellington, for 6d.

The Regulations do not apply to the sale at one time of not more than 25 fruit trees of mixed varieties or not more than 10 of the same variety; to the sale of fruit trees for domestic purposes and which are not intended to be planted out in a commercial orchard; or to the sale of seedling trees of fruit-tree root stocks that have not been budded or grafted.

—*A. R. GRAINGER,*
Principal Horticultural Inspector,
Department of Agriculture,
Wellington

◆

The Economic Aspect of Spray Irrigation of Pasture

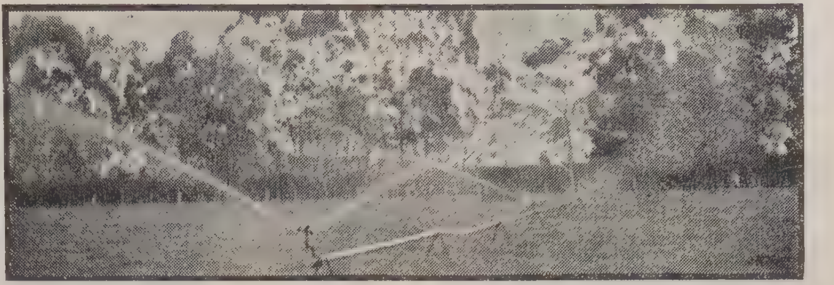
INFORMATION about results of experimental work on spray irrigation of pastures at the Department of Agriculture's Soil Research Station at Rukuhia, Hamilton, was brought up to date in an article by H. E. Annett, Field Research Officer at the station, in last month's "Journal", which followed a first summary of investigations published in June, 1950. To the many farmers who are considering the installation of such plants to combat drought periods and who want to know the financial returns to be expected, the following account of the first year's experience of spray irrigation on the same writer's farm will be of interest.

WORK at the Rukuhia Soil Research Station has led to the recommendation that 1 acre be irrigated for every 5 or 6 cows in the herd. Thus on a 100-acre farm milking 75 cows 12 to 15 acres would be a sufficient area to irrigate, provided the pasture was a good average one of ryegrass and white clover. During summer the irrigated pasture should receive 1in. of water every 10 days, and if the rainfall during any 10-day period falls below 1in., the deficit should be made up by spray irrigation. Only the top 4 to 6in. of pasture land need be kept moist. Excess water—say, 2in. every 10 days—appears to be less effective, possibly because waterlogging deprives the roots of air.

Irrigation of Other Crops

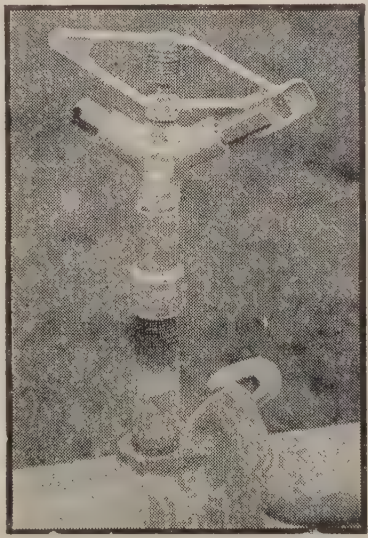
These recommendations apply to pasture irrigation. For deeper-rooted crops other systems are necessary. In the Mildura district of Australia, Giles and Alexander have shown that for tomatoes the soil should be irrigated to field capacity to a depth of 3 or 4ft. at intervals of 28 days and more frequent irrigations are unnecessary. However, to wet the soil to this depth would require the application of many inches of water probably at least 8 to 10in. at each irrigation.

Some New Zealand farmers are using spray irrigation on lucerne. This deep-rooting plant requires more water than pasture, and application should be at the rate of 1½ to 2in. every 10 days instead of 1in. as recommended for pasture.



Climate and Grass Growth

The table below gives the mean monthly rainfall during the past 33 years and the mean daily temperature for 29 years recorded at Ruakura Animal Research Station, which is 2 miles from Hamilton. Monthly rainfall figures for the past 4 years recorded at Rukuhia Soil Research Station are also given; the two stations are about 4 miles apart.



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	MEAN MONTHLY RAINFALL (inches)					MEAN DAILY TEMPERATURE (degrees)
	Rukuhia				Ruakura	
	1947	1948	1949	1950	1916–49	Ruakura, 1920–49
January ..	2.67	2.80	1.79	1.81	3.71	63.8
February ..	1.22	2.61	2.71	4.49	3.24	64.1
March ..	2.98	2.23	4.05	1.15	2.93	62.0
April ..	3.62	5.00	5.62	3.17	3.82	57.6
May ..	2.75	9.54	3.91	2.26	4.75	52.0
June ..	8.59	4.12	4.56	6.50	4.69	48.2
July ..	3.33	4.86	5.01	2.48	4.96	46.9
August ..	4.42	4.72	1.78	4.46	3.96	48.2
September ..	3.59	3.21	1.51	1.91	3.58	51.5
October ..	6.85	9.79	3.24	3.68	3.91	52.9
November ..	1.72	4.31	2.85	5.27	3.78	58.2
December ..	2.55	2.17	3.05	1.91	3.26	61.5
Year ..	44.29	55.36	40.08	39.09	46.59	55.7

The mean rainfall over 33 years would make it appear that the distribution is perfect for grass growth, but monthly or annual rainfall figures are misleading, as almost every year pastures suffer from drought to some extent in the Waikato and in many other areas with an equal or even higher annual rainfall. The Hamilton clay loam on the hilltops is the first to suffer, then the Horotiu sandy loams, and last the lower-lying Te Kowhai loams. The worst drought periods occur usually in January, February, and March, when the mean temperature is highest and frequent high winds rapidly dry up much of the rain which falls in this period.

Daily readings are made at Rukuhia of the evaporation from a free water surface. The total yearly evaporation during the past 3 years has been: 1948, 36in.; 1949, 33in.; 1950, 42in. In each year the greatest evaporation (between 5 and 6in.) took place in January. The February evaporation is almost as great, followed very closely by that in December.

A marked feature of the Waikato summer rainfall is that heavy falls tend to occur within a few days each month, and between these falls are long periods of hot, dry weather. Much of the rain evaporates from the hot soil, evaporation being aided by frequent strong winds.

Pastures in the Waikato seem unable to withstand summer drought conditions for more than about 10 days, and dairy production falls off rapidly when such periods occur. As February has the highest mean temperature, the effect of drought is accentuated at that period.

There is flush growth of grass in the Waikato at the end of October or early November, but experimental work shows that under irrigation the greatest growth occurs during February. This in itself is a strong argument for spray irrigation. Further, it would seem that irrigation of pasture in summer may have an important bearing on the health of dairy stock. At this time the cow is required not only to produce milk, but to provide for the developing calf, which from February begins to grow rapidly. Hitherto poor feeding in winter has been blamed for some stock troubles, but it may well be that such troubles start earlier when animals are underfed in the drought periods of late summer and early autumn.

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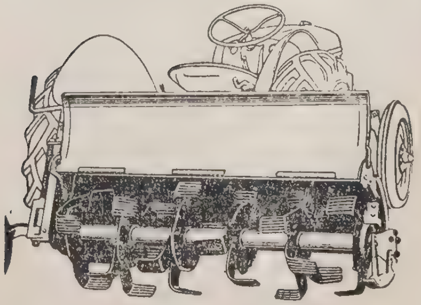

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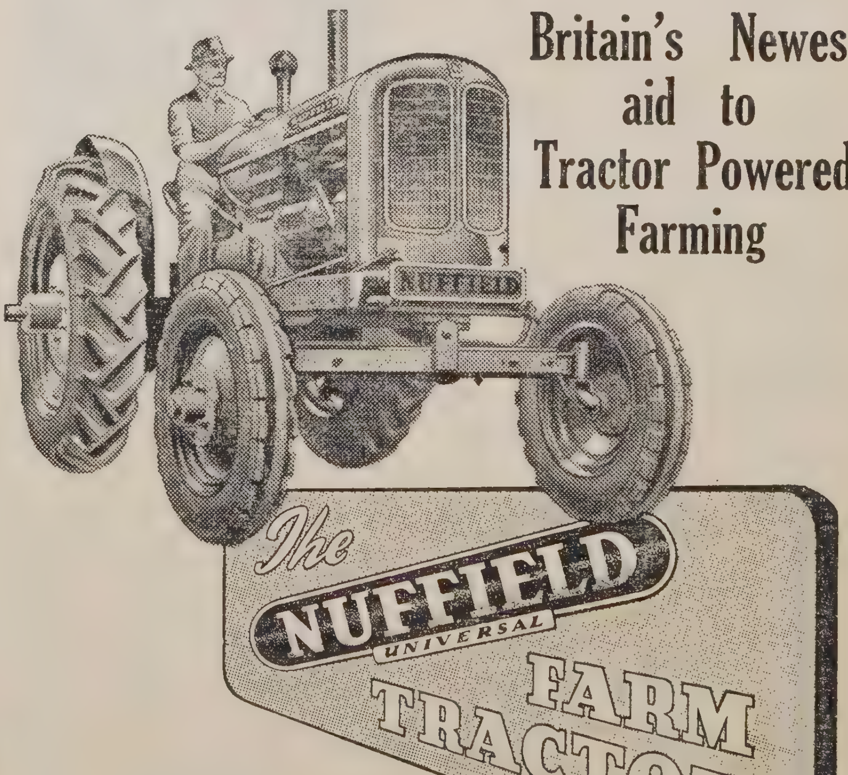

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TABLE 1A—MONTHLY BUTTERFAT PRODUCTION

	AVERAGE PER COW (lb.)			AVERAGE PER HERD (lb.)	
	Matangi group	"Grasslands"	Difference	Group (calculated)	"Grasslands"
August ..	36	37 (54)	+1	1,944	1,998
September ..	39	38 (67)	—1	2,613	2,546
October ..	41	42 (71)	+1	2,911	2,982
November ..	40	38 (74)	—2	2,960	2,812
December ..	38	39 (74)	+1	2,812	2,886
January ..	30	30 (74)	None	2,220	2,220
February ..	26	26 (70)	None	1,820	1,820
Totals				17,280	17,264

A Year's Operations

A spray irrigation plant was installed on the writer's farm, "Grasslands", Matangi, early in 1950, and the results of the first year's operation are described in this article.

The summer of 1949-50 was particularly dry, monthly rainfall totals being: November, 2.85in.; December, 3.05in.; January, 1.81in.; February, 4.49in.; March, 1.15in. Little rain fell from December 10 to the end of January, and February was very dry except for 4½in. of rain which fell between the 9th and 12th. March was exceptionally dry.

Irrigation System

The area irrigated was only 6 acres. The farm is a little smaller than 100 acres and about 80 cows are milked. Irrigation was not started until February 1 and irrigated pasture was not grazed until March 1. Water was provided by digging two wells 15ft. deep, each of which gave fully 1500 gallons per hour, though only 1650 gallons an hour were used in all. The labour required was about 10 minutes at intervals of 3½ hours to change the movable pipes to new positions, and 1 acre per day was irrigated with about 1in. of water. The soil is Horotiu sandy loam and the pasture was high-quality ryegrass-white clover.

Influence on Butterfat Averages

The monthly butterfat average for the Matangi group of 46 herds is shown in Table 1A side by side with that of the "Grasslands" herd, a member of that group. Figures in parentheses after the "Grasslands" butterfat average show the number of cows included in each test. The last two columns show the butterfat production month by month in the "Grasslands" herd compared with what it would have been with the same number of cows multiplied by the group average. As shown in Table 2, however, the rate of drying off was far greater after March in the group cows than in the "Grasslands" herd.

Up to February production per cow at "Grasslands" was almost identical with that of the group. From March 1 the "Grasslands" herd was grazed on irrigated pasture which had excellent growth. The cows were given daily breaks of ½ acre for 2 hours in the morning and 1 hour in the afternoon, an electric fence being used. Figures for the 3 months which followed are compared in Table 1B. This indicates that irrigation resulted in an increase in production of only 966lb., but the real increase was much greater, for two reasons: First, the May test at "Grasslands" was 12 days later than usual and the herd average would have been much higher than 18lb. of butterfat if the test had been taken at the normal date. Second, cows in the Matangi group on unirrigated pastures were drying off at a much greater rate than in the "Grasslands" herd.

Lactation and Production

The figures in Tables 1A and 1B assume that the rate of drying off in the group cows was the same as that in the "Grasslands" herd. Table 2 shows that in fact the rate of drying off in the group cows, especially in April and May, was far greater.

TABLE 2—LENGTH OF LACTATION

	MATANGI GROUP			"GRASSLANDS" HERD	
	Number of herds	Number of cows tested	Percentage of February number of cows	Number of cows tested	Percentage of February number of cows
February ..	46	3 022	100	70	100
March ..	46	2.961	98	73	104
April ..	39	2,223	74	66	94
May ..	20	824	27	49	70

TABLE 3—BUTTERFAT PRODUCTION

	NUMBER OF COWS MILKED		AVERAGE BUTTERFAT (lb.)		TOTAL BUTTERFAT (lb.)	
	Group (calculated)	"Grasslands"	Group	"Grasslands"	Group (calculated)	"Grasslands"
March ..	71	73	26	32	1,840	2,336
April ..	52	66	20	28	1,040	1,848
May ..	19	49	18	18	342	882
Total butterfat					3,222	5,066

TABLE 1B—MONTHLY BUTTERFAT PRODUCTION

	AVERAGE PER COW (lb.)			AVERAGE PER HERD (lb.)	
	Matangi group	"Grasslands"	Difference	Group (calculated)	"Grasslands"
March	26	32 (73)	+6	1,898	2,336
April	20	28 (66)	+8	1,320	1,848
May	18	18 (49)	None	882	882
Totals				4,100	5,066

Two sets of figures are shown in Table 3, one for the production from the number of cows tested each month and the other calculated from the number of cows which would have been milked if they had dried off at the same rate as the cows on unirrigated pasture in the rest of the group. This indicates an increase of production during March, April, and May of 1844lb. of butterfat as a result of irrigation. Had the May test of the "Grasslands" herd been carried out at the usual time—12 days earlier—the increase in production would have exceeded 2000lb. of butterfat.

Records kept at "Grasslands" for 20 years show that in a season of good summer and autumn rainfall about 45 per cent. of production is obtained after Christmas, but in a dry summer and autumn only 25 to 30 per cent. of production is obtained after Christmas. On this basis it had been estimated that production would be about 19,000lb. of butterfat. In fact it reached 21,000lb., indicating an increase of 2000lb. of butterfat as a result of irrigation.

Costs

The cost of the electric power used was £5 and the cost per inch of water per acre was 3s. About 2300lb. of extra butterfat would be required to pay for the total cost of the scheme, and this was almost obtained in the first season.

Other Advantages

As well as the increase in butterfat production, pasture irrigation gave other indirect returns:—

During March and April no silage feeding was necessary, enabling the saving of about 40 tons of silage for winter feed.

Irrigation ceased on April 12, and despite several further grazings in April there was excellent growth in May and June of what is described as autumn-saved pasture. There was no other feed nearly as good on the farm. This proved invaluable for feeding the July calvers. An average of 20 fresh calvers grazed one of these 2-acre paddocks from June 25 to July 15, the grazing being in small areas controlled by an electric fence.

The good irrigated grass available to the cows in March and April enabled them to remain in good condition well into the winter and the calving season was remarkably free from trouble.

The usual practice of grazing chou moellier for summer feed is no longer necessary.

The surprising fact is that these good results were obtained with only 6 acres under irrigation.

Extension of System

Because of the satisfactory returns in this first season the area under irrigation in the 1950-51 season has been increased to 14 acres. A 4in. asbestos underground main which has been laid centrally through the area saves labour, as only a 5-chain length of 3in. light galvanised spray line has to be moved every 3½ hours. This is fitted with five monsoon revolving sprays each covering 1/10 acre. The five sprays distribute about 3000 gallons of water per hour.

SUMMARY OF IRRIGATIONS AND GRAZINGS AT "GRASSLANDS", MATANGI, 1950

IRRIGATIONS

First paddock		Second paddock		Third paddock	
February 4, 6, and 7	1.68in.	February 1 to 3 ..	1.68in.	March 2 and 3 ..	1.1in.
February 9 and 10	1.68in.	February 8 and 9 ..	1.68in.	March 12 to 14 ..	0.8in
February 27 and 28 and March 1 ..	0.8in.	February 25 and 26	1.0in.	March 24 and 25 ..	0.8in
March 9 and 10 ..	0.8in.	March 7 and 8 ..	0.8in.	April 4 and 5 ..	0.8in
March 21 and 22 ..	0.8in.	March 21 to 23 ..	0.8in.		
April 1 to 4	0.8in.	March 29 and 30 ..	0.8in.		
		April 11 and 12 ..	0.8in.		
		Unfinished (rain)			
Total	6.56in.	Total	7.56in.	Total	3.5in

This equals 35 acre-inches, requiring 400 hours of power use at 3d. per hour, or a total of £5, which is less than 3s. per acre-inch.

GRAZINGS

First paddock		Second paddock		Third paddock	
March 6 to 9 ..	70 cows	March 2 to 5 ..	70 cows	March 21 to 24 ..	70 cows
March 17 to 20 ..	70 cows	March 13 to 16 ..	70 cows	April 1 to 3 ..	70 cows
March 28 to 31 ..	70 cows	March 25 to 27 ..	70 cows	April 12 to 14 ..	70 cows
April 8 to 11 ..	70 cows	April 4 to 7 ..	70 cows	April 25 to 28— 65 cows on whole paddock for 3 nights	
April 19 to 21 ..	65 cows	April 15 to 18 ..	65 cows		

The paddocks were grazed in ½-acre breaks by the use of an electric fence for 2 hours each morning and 1 hour each afternoon.

Effect on Water-table

The depth below ground of the water surface in the wells has been determined regularly on the farm. Early in August the water was 11ft. 6in. below the surface and in November, 1950, it was 10ft. 5in.; that is, the water-table had risen 13in. From August to November the total rainfall recorded at the Rukuhia Soil Research Station was 15.32in. No figures are available for the writer's farm, but on November 5 and 6 there was a very heavy fall estimated at 5in., whereas only 2.25in. was recorded at Rukuhia. Therefore a rainfall of about 18in. was accompanied by a rise in the subsoil water-table of 13in.

Drainage records at Rukuhia show that the soil was saturated throughout August and up to September 21, during the middle of October, and in the second week in November, so that from August to the end of November most of the rain received would be expected to penetrate to the subsoil.

When both wells were being used in mid-December to supply five sprays delivering more than 3000 gallons per hour, the water-table dropped in the wells from 10ft. 5in. to 12ft. 8in. After 8 hours of pumping there was no further fall in the water level.

A third well is being installed, and speeding up the pump will enable the five sprays to deliver up to their full capacity of 750 gallons per hour each, or a total of 3750 gallons.

Summary of Recommendations

Results at Rukuhia Soil Research Station and farming experience have given rise to these recommendations for the spray irrigation of pasture:—

Use the best pastures available. Very poor pastures should be resown with a good mixture. Suitable mixtures include perennial and short-rotation or Italian ryegrass, cocksfoot, and white and red clover.

Too much water is harmful. Grass grows best when the soil is kept merely moist. One inch of water applied every 10 days provides optimum growth. Starting from early spring, the aim should be to make up the rainfall to 1in. in any 10-day period when it falls short of that amount. For lucerne 1½ to 2in. should be applied instead of 1in.

Water must not be applied at a greater rate than 1in. in 2 to 3 hours.

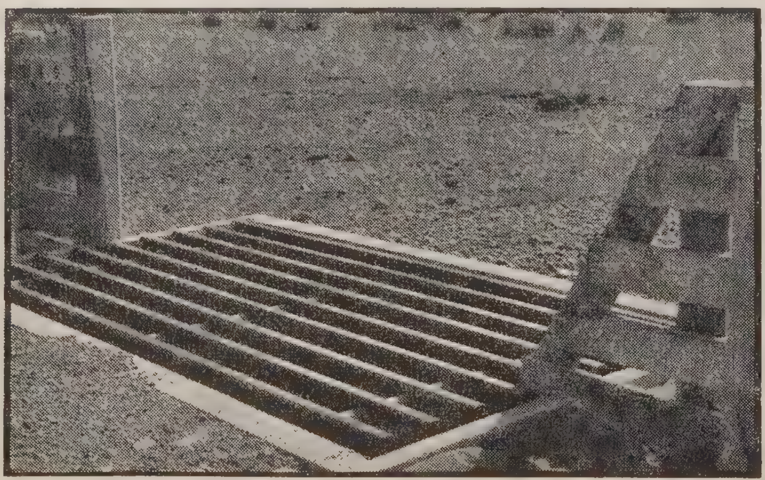
A supply of 1500 to 3000 gallons per hour is sufficient to irrigate 6 to 12 acres in a 10-day period during farm working hours. To irrigate 1 acre with 1in. of water requires 22,600 gallons.

Allow 1 acre under irrigation for every 5 to 6 cows.

Feed the irrigated grass in breaks, using an electric fence.

◆

An Efficient Type of Cattle Stop



LENGTHS of old railway line are a suitable material for the rails of a cattle stop and were used in the construction of the efficient stop illustrated, with pipe as the separating pieces. The side panels prevent sheep from edging round the posts. Timber or steel piping may be used for the rails, but the spacing and the distance at which they are supported require to be varied to suit the strength of the material. The structure must be capable of supporting the load from the type of traffic likely to cross it with the wheels in any position, assuming that the load from one wheel is distributed over not more than two rails; a central bearer will provide against the load from a single-wheeled trailer. The maximum opening recommended between railway-line rails is 5in. and between pipes or wooden rails 6in. from centre to centre. Provision must be made for drainage of the pit beneath the cattle stop, and the rails should be removable or other means provided for cleaning the pit.

Results of Laying Trial for Breeding Pullets

THE second breeders' laying trial held at the Department of Agriculture's Poultry Demonstration Plant, Upper Hutt, started on March 13, 1950, and ended on February 11, 1951. In this article F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, reports the results obtained from 22 pens of pullets and comments on the information supplied by this trial.

THE first breeders' laying trial held at the Poultry Demonstration Plant in 1949-50 was started with the object of affording poultry breeders facilities for testing pullets as potential breeding birds in the second laying season. It was not established on a competitive basis for awards, and in this respect it differed from any laying trials or contests previously held in New Zealand. Accordingly the response to the invitation to enter birds for the 1950-51 trial was awaited with considerable interest. Fifteen entries of 20 pullets each were received in 1949-50, and the increase to 22 entries in 1950-51 was considered a satisfactory indication of interest in this new type of trial. Information received from poultry breeders who entered pens showed that the facilities offered by the Department are being used for testing pullets from special matings and new lines of blood as well as random samples of pullets. It would appear that greater use will be made of this trial when breeders appreciate to the full the possibilities of obtaining accurate information about their birds which is indispensable to any planned and satisfactory breeding programme.

Apart from the data supplied to breeders entering pens in the trial, it is intended that other informative and educational data shall be collected from the trial and published in an annual report for the benefit of all poultry producers.

White Leghorns are the most popular breed of fowl and many breeding pens are selected on handling and observation only, but improved results are likely if birds are tested for laying ability in their pullet year. The breeders' laying trial affords facilities for testing possible breeding birds.

Entries for 1950-51 Trial

Entries for the second trial numbered 22 pens containing 440 pullets—5 pens of Australorps, 1 of Rhode Island Reds, and 16 of White Leghorns. As in the previous trial, the birds were drawn from widely distributed areas, Auckland sending 4 pens, Tuakau 1, Hawkes Bay 7, Gisborne 1, Wanganui 1, Feilding 1, Dunedin 2, Christchurch 1, and the Hutt Valley 4. All the birds arrived in a satisfactory condition and from reports received appear to have reached their owners at the completion of the trial without transport difficulties; after the first trial delays caused trouble to birds on their return journey to Auckland.

The primary objective of the trials is to help poultry producers to select their best pullets on performance for future breeding. The high economy value of Australorps was shown by the performance of Pen 1 in the 1950-51 trial.

General Management

As in the previous year, each entry of 20 pullets was housed intensively in a pen measuring 14ft. x 13ft. Trap nesting was begun on March 13, 1950, and the trial ended 48 weeks later on February 11, 1951. Copies of the trap-nest record sheets for each 4-weekly period were sent to the breeders at the end of each of the 12 periods. Eggs were weighed for one week in the 3rd, 6th, 9th, and 12th periods and results recorded on the trap-nest sheets.

The birds were fed wet mash and grain, with greenfeed daily. They had access at all times to water, metal grit, and oyster shell. A light feed of grain (about ½oz. per bird) was given early in the morning, wet mash at 10.30 a.m., and a full grain feed in the afternoon. Greenfeed was given at 1 p.m. On Sundays no wet mash was fed, but a full grain feed was given morning and afternoon.

The grain consisted of 10lb. each of barley, oats, and maize to each 60lb. of wheat, and the mash mixture was:—

	lb.
Bran	23
Pollard	21
Wheat meal	24
Ground oats	7
Maize meal	10
Meat meal (60 per cent. protein)	13
Common salt	1
Oyster-shell dust	1
	100

To each 100lb. of mash was added ¾ pint of a fish oil containing 2000 international units of vitamin A per gramme.

The table below gives details of the egg production of all birds which were alive at the end of the trial and indicates which birds were accredited for breeding. The standard used for this purpose was:—

The bird must have laid 180 eggs or more in the 48 weeks.

It must have laid a preponderance of eggs of 2oz. or heavier during the four periods of egg weighing.

It must weigh a minimum of 4¾lb. for a Leghorn or 5¾lb. for an Australorp or Rhode Island Red, these being the minimum weights permitted under the New Zealand Poultry Flock Improvement Plan.

Egg Production

In the egg-production figures in the next column the flock-housed average is the average production per bird based on the number of birds in the pen at the start (20).

Pen number	Total eggs produced	Flock-housed average
	Australorps	
1 ..	.. 3,978	198.9
2 ..	.. 3,699	185.0
4 ..	.. 3,467	173.3
5 ..	.. 3,225	161.2
3 ..	.. 3,140	157.0
	Rhode Island Reds	
6 ..	.. 3,493	174.6
	White Leghorns	
7 ..	.. 3,556	177.8
16 ..	.. 3,543	177.1
11 ..	.. 3,486	174.3
17 ..	.. 3,445	172.2
20 ..	.. 3,370	168.5
22 ..	.. 3,268	163.4
21 ..	.. 3,205	160.2
15 ..	.. 3,139	156.9
14 ..	.. 3,138	156.9
8 ..	.. 3,056	152.8
18 ..	.. 2,929	146.4
23 ..	.. 2,733	136.6
10 ..	.. 2,639	131.9
12 ..	.. 2,578	128.9
19 ..	.. 2,499	124.9
9 ..	.. 1,942	97.1

R. Willers's pen of Australorps failed by only 22 to lay 4000 eggs in the 48 weeks. With a flock-housed average of nearly 199 eggs per bird, this pen has set a splendid target.

Flock-housed averages for heavy and light breeds were: Heavy breeds (6 pens), 175 eggs; light breeds (16 pens), 151 eggs.

Accredited Breeding Birds

Owners of pens which obtained most accreditations and the numbers of birds accredited are:—

Australorps: R. Willers, Feilding, 12; A. L. Salisbury, Upper Hutt, 8.

White Leghorns: G. H. Young, Stokes Valley, Wellington, 11; T. A. Bolton, Gisborne, 10.

The accredited bird with the highest production was G. H. Young's White Leghorn which laid 256 eggs in Pen 15; next was an accredited Australorp in Pen 1, owned by R. Willers, which laid 255 eggs.

BREEDER AND PEN NUMBER	WEIGHT (in pounds) OF EACH BIRD BEFORE AND AFTER TRIAL, AND 48 WEEKS' PRODUCTION OF EACH BIRD																			TOTAL FOR PEN (including floor eggs)
	Australorps																			
Willers, R. .. .. (1)	6¼-7¾ 196*	5¼-6 239*	5¼-5¾ 222*	5¾-7 255*	5¾-6 189*	4¾-5¾ 229	5¾-6¼ 179	5¾-6¾ 228*	5¼-6 212*	5¼-6 184*	5-5½ 241	4¾-4½ 205	5-6 228*	6-7½ 140	5¾-7¼ 245*	6-6½ 192*	†-7¾ 182*			3,978
Anderson, E. P. .. (2)	4½-5½ 234	4-5½ 170	4½-5 182	4-5 181	4¾-6¼ 161	4¾-6 138	4¼-4¼ 142	4½-4½ 214	4-5 110	4¼-6 180*	5¼-5¾ 185*	4½-5¼ 218	5-5¾ 219*	†-4 163	5¼-6¼ 173	4½-5¾ 195*	4-4 231	5½-7 213*	4½-5½ 214*	3,699
Mitchell, M. .. (3)	4½-5½ 86	5¾-7¼ 151	6½-7½ 196*	5¼-6½ 181*	5-5½ 157	4¾-5 96	5-7 165	5½-6 89	4¾-6 216*	5¾-7½ 139	5½-6½ 125	6-7 169	4½-6¼ 208*	5-5½ 222	4¾-5½ 196	5¼-6¾ 191	5¼-5¾ 195*			3,140
Green, Mrs. G. K. (4)	5¾-6½ 150	4¼-5½ 232	5-5¾ 212*	5¾-7¼ 226*	4¾-6 194*	4¼-5¼ 183	4¾-5¼ 48	4¾-6½ 5	5½-7 192*	4¾-5½ 232	4¾-4½ 201	4¾-5 251	4½-5½ 188	5-5 202	4¾-6¼ 202*	5¼-6 254*	4¾-6 195*	4½-5¾ 116	4¾-6¼ 149	3,467
Salisbury, A. E. .. (5)	6-7½ 161	5¾-5¼ 125	4½-5¼ 181	6-7¼ 179	6-5½ 193	5-6 182*	5¼-5¾ 192*	5½-6¾ 119	5-5¾ 223*	4¾-6 200*	5¼-6¾ 141	5¾-4¾ 54	5½-5 120	5¼-6 221*	5¾-6¼ 231*	5¼-6 197*	5-6¾ 191*			3,225
	Rhode Island Reds																			
Batkin, L. .. .. (6)	4½-6 156	5-5¾ 178	4½-5¾ 147	5-5¾ 242*	4¼-6 136	5¾-5¾ 182*	6-5¾ 182*	4½-5¼ 162	4½-5 140	4¾-5¾ 202*	4¾-5¾ 217*	4¼-5¼ 175	4½-5½ 126	4¼-5¾ 170	4½-5½ 194*	4¼-6 169	4-5¼ 174	4-5 203		3,493
	White Leghorns																			
Kirk, M. J. .. (7)	3¾-5 229*	3¾-4½ 165	3½-4 140	3¾-4¼ 184	4-5 170	4¼-4½ 203	4-5¼ 205*	3¾-4¾ 228*	3¾-5 183*	4¼-5½ 178	4-4¼ 221	4-4½ 235	4-4¾ 208*	3¾-4¼ 198	4-4¾ 222*	4½-4½ 203	4-4½ 169			3,556
Smith, A. G. .. (8)	3¾-4¼ 124	3½-4¼ 139	4-4¼ 118	4¼-5¼ 187*	4-5¼ 105	4¼-4¾ 164	5-5¾ 160	4¼-4½ 152	4½-5 202*	4¼-4¾ 182*	4½-5 161	4½-5 203*	4-5 96	3¾-4¼ 204	4-4¾ 186*	3¾-5 153	4-5¼ 169	4¼-5¾ 147	3¾-4¾ 91	3,056
Friis Bros. .. (9)	3¾-4¼ 177	4¾-5¼ 232*	4½-4¾ 61	3¾-4¾ 236*	4¼-5¼ 167	4-4 178	4¼-3¾ 65	4¼-4 31	4-4½ 138	4-3¾ 110	4-4¾ 239*	3¾-3¾ 100								1,942
Crawford, A. C. .. (10)	3½-4¾ 172	3¾-4½ 177	4-4¾ 217*	3½-3½ 75	4-5 127	4-4¾ 180*	4½-5½ 141	3¾-5¼ 90	4½-5¾ 90	3¾-4 220	4½-5 213*	4-4¾ 231*	4¼-5¼ 215*	4½-5½ 54	4¼-5½ 89					2,639
Hepburn, A. W. .. (11)	4-4 213	4-4¾ 120	3¾-4¼ 193	4½-4¾ 180*	3¾-4½ 176	3¾-4 187	3½-4 173	3¾-4½ 150	4-4¼ 197	3¾-4¼ 239	4½-5½ 149	3¾-4¾ 189*	3½-4½ 192	3¼-3¾ 177	4-5¼ 161	3¼-4 178	3½-4 223	4-5¼ 194*		3,486
Hetherington, R. W. (12)	3¾-4¼ 172	4-4½ 62	3¾-4 142	4½-4¼ 94	4¼-4½ 159	3¾-4½ 157	4-4¼ 139	4-4¾ 193*	4-4¼ 178	4-4¾ 142	4-5 119	3¾-4½ 195	4-4½ 128	5-5½ 212*	4½-5¼ 169	4-4 154				2,578
Young, G. H. .. (14)	4¾-5¾ 145	4¼-5 197*	4¼-5 214*	4¾-5½ 203*	4½-4¾ 228*	5¼-5¼ 239*	4½-5¼ 206*	5-5½ 199*	4½-4¼ 136	4½-5 165	4¾-5 189*	4¼-4¾ 238*	4½-5¼ 195*	4¾-5¾ 180*						3,139
Young, G. H. .. (15)	4½-5 206*	5½-6 179	4¾-5¼ 161	5¼-5½ Nil	4¾-5¾ 192*	4¾-4½ 155	4¾-5½ 34	4¾-6 144	4¾-5¼ 244*	4½-5 91	4½-5¼ 217*	4½-5½ 236*	4¾-5¼ 202*	4¾-5½ 209*	5½-5¾ 9	5½-5¾ 92	4¾-4¾ 256*	4½-4¼ 173		3,138
Bolton, T. A. .. (16)	4½-5¼ 179	4½-5 181*	4¼-4¾ 122	4-4¾ 218*	4¼-5 205*	4½-5¼ 142	5-5½ 181*	4¼-5½ 219*	3¾-4¾ 118	4-3¾ 235*	4-4¾ 199*	4-5 126	4-5 221*	3¾-4¼ 212	4-4¾ 200*	4¼-4¾ 153	4¼-4¾ 174	4-5 199*	4-4¾ 159	3,543
Anderson, E. P. .. (17)	4-4½ 158	3½-4 198	4-4 177	3½-4½ 161	3¾-4¼ 133	3¾-4 226	4-4¾ 150	4¼-4½ 132	4-4¾ 191*	4¼-4¾ 186*	4-4 198	4¼-5 239*	4½-4¾ 198*	3¾-5 109	4¾-4¾ 208	4-4¼ 20	3¾-4 216	4¼-4¾ 237*		3,445
Winters Bros. .. (18)	4½-4½ 161	4½-5 113	4½-4¾ 187*	5-5 39	3¾-4 215	5½-5¼ 136	5¼-5½ 143	5¼-5¼ 149	5-5¼ 111	5¼-5½ 112	4¾-5 127	5¼-5¼ 176	4½-4¾ 163	5¾-4¾ 162	4¾-5 200*	4¼-4¾ 181*	4¼-4½ 169	5-5¼ 135	5-5½ 176	2,929
Greenfield, E. B. .. (19)	3¾-5 143	4-5¼ 189*	4-6 92	4-5¾ 175	4-5½ 179	3¾-4¼ 115	4¾-6¾ 55	4¼-5¾ 108	4-5¾ 132	3¾-5½ 159	4-5 114	4¼-5¼ 228*	4-5½ 184*	4¼-5½ 160	3½-5¼ 171	4½-5¼ 150				2,499
Burton, J. .. .. (20)	3¼-4¼ 159	3¼-4¼ 178	3¼-4¼ 179	3¼-4¼ 190	3½-4¾ 186*	4-4¾ 173	3½-4¼ 171	3½-4 153	3¾-4½ 170	4-5 153	3½-4¼ 231	4-4¾ 141	4-4¾ 41	3¾-4½ 168	3¾-4½ 177	3½-4½ 166	3½-4¾ 171	3½-4¾ 181*	3½-4¾ 204*	3,370
Lincoln College .. (21)	3¾-4½ 189	4¾-5½ 182	4½-5 148	3¾-4½ 217	4-5 233	4½-6 120	3¾-4¾ 197	3¾-5 142	4¾-5¼ 215	4¼-5 170	4½-5¾ 144	4-4¾ 209	4-5 181	4¼-5½ 208	4½-5 128	4¼-5 112				3,205
Salisbury, A. E. .. (22)	4¼-5 187*	4¼-4 158	4¼-4½ 124	4-4¾ 216*	4-4½ 113	4¼-5 156	4¼-4¼ 183	4½-5½ 152	4-4 158	5-5 131	4½-4¾ 192*	4¼-4¼ 164	4¼-4½ 160	4¼-5 182*	4¾-5½ 186*	4¾-5¼ 181*				3,268
Chapman, H. E. .. (23)	4½-5 145	4¼-5¾ 173	4-5 162	4½-5 160	4¼-5 129	4¼-5¼ 192	4½-6¼ 126	4¾-6 188	4½-6¼ 163	4¼-4¾ 197	4½-6 85	4½-4¾ 224	4-5¼ 147		4-4¾ 207	4¼-5¾ 141	†-4¾ 91			2,733

Only birds still alive at the end of the 48 weeks are recorded.
* Accredited breeding bird. † Replacement bird not weighed before trial.

In the table at the bottom of page 402 some birds which laid more than 180 eggs are not shown as accredited breeders. In some cases the birds were underweight, and in others the reason was underweight eggs or a major breeding fault.

Egg Size

The number of birds which laid underweight eggs (lighter than 2oz.), based on those alive at the end of the trial, was 8 per cent. of the heavy breeds (107 birds) and 6 per cent. of the White Leghorns (268 birds). Some of these pullets may lay 2oz. eggs when they become hens.

Egg size is a genetical character which is transmissible from parent to progeny, and if pullets which lay underweight eggs are used for breeding, this undesirable character may be passed on to the progeny.

Unrecorded Eggs

Though every care is taken to prevent birds laying on the floor, a number of floor eggs will always be recorded. In this trial 3 per cent. of the total eggs laid by the heavy breeds and 2½ per cent. of those laid by White Leghorns were unrecorded, representing an average of 5 eggs per heavy-breed pullet and 4 eggs per White Leghorn pullet. These figures are about the same as those recorded in the 1949-50 trial.

Food Consumption

As in the first trial, figures for consumption of mash and grain were recorded for each period. The table which follows is based on the consumption by all birds in the trial.

PERIOD	FOOD PER BIRD (lb.)		
(28 days)	Mash	Grain	Total
1	2.6	4.0	6.6
2	3.0	3.6	6.6
3	4.0	3.6	7.6
4	4.0	3.5	7.5
5	4.6	3.5	8.1
6	4.7	3.5	8.2
7	4.4	3.9	8.3
8	4.0	4.0	8.0
9	3.8	4.0	7.8
10	3.8	3.9	7.7
11	3.6	4.5	8.1
12	3.1	5.1	8.2
48 weeks	45.6	47.1	92.7

Based on costs at the Poultry Demonstration Plant, the mash consumed, including oil, cost 9s. 11d. per bird and the grain 8s. 3d., a total of 18s. 2d. This figure does not include the cost of oyster shell and metal grit.

Mortality

Losses from all causes during the trial were 13 birds from the heavy-breed pens (10.8 per cent.) and 52 birds from the White Leghorns (16.2 per cent.). Two of the 6 heavy-breed pens and 4 of the 16 White Leghorn pens lost only one bird each. Losses for 1950-51 were fewer than those for 1949-50.

All birds which died were sent to the Animal Research Station, Wallaceville, for post-mortem examination and in each case a report was sent to the owner. Following is a summary of the reports received from the Animal Research Station:—

Though the trials are intended primarily for the testing of birds for purebred mating, good-quality stock should also be used for crossbred matings.

	Heavy breeds	Light breeds
Leucosis	5	16
Tumours	3	6
Duodenal coccidiosis	—	5
Vent picked	—	5*
Egg peritonitis	—	3
Ruptured liver	1	—
Impacted gizzard	1	1
Impacted crop	1	1
Impacted rectum	—	1
Tuberculosis	1	—
Blindness	—	1
Ruptured spleen	—	1
Cystic kidneys	—	2
Vent gleet	—	1
Ulcerated gut	—	1
Tapeworms	—	1
No significant findings	1	7
	13	52

* All in the same pen.

The first three diseases named were also the chief causes of deaths in the 1949-50 trial. Again these figures reflect the importance of these three diseases in the poultry industry.

Comparisons between the data collected for the 1950-51 trial and those for the previous trial show the following points:—

	1949–50	1950–51
Egg-production (flock-housed average per bird)—		
Heavy breeds	149.6	175.0
Light breeds	152.6	151.3
Percentage of birds laying underweight eggs	11	6.6
Unrecorded eggs (per cent.)—		
Heavy breeds	3.1	3.0
Light breeds	3.1	2.5
Food consumption per bird—		
Mash	41.5lb.	45.6lb.
Grain	47.5lb.	47.1lb.
Cost	15s. 8d.	18s. 2d.
Mortality (per cent.)—		
Heavy breeds	12.5	10.8
Light breeds	18.1	16.2

The 1951-52 Trial

Another trial was begun on March 5 of this year with entries increased to 25 pens. Two pens from the Oamaru district failed to reach Wellington because of transport difficulties.

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Radio Broadcasts to Farmers

A RADIO talk to farmers will be given from Station 1YZ Rotorua at 7.15 p.m. as follows:—

June 14—"Calving Troubles", by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

The following radio talks to farmers will be given from Station 4YA Dunedin at 7.30 p.m.:—

June 6—"Tuberculin Testing Town Supply Herds", by C. V. Dayus, Livestock Superintendent, Department of Agriculture, Dunedin.

June 20—"Choosing Suitable Varieties of Fruit Trees", by S. Kemp, Orchard Instructor, Department of Agriculture, Alexandra.

Talks will be given from Station 4YZ Invercargill at 7.15 p.m. as follows:—

June 11—"The Farm Orchard", by D. Wilson, Horticultural Instructor, Department of Agriculture, Invercargill.

June 18—"Soil Fertility", recorded talk by research staff of Department of Agriculture Soil Research Station, Rukuhia.

June 25—"Young Farmers' Clubs", by chairman, Southland District Committee, New Zealand Federation of Young Farmers' Clubs.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 1YD Auckland on Thursdays at 7.30 p.m., 1XN Whangarei on Mondays and Wednesdays at 8.10 p.m., 1XH Hamilton on Mondays at 8.45 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., 3YA Christchurch on Mondays at 12.20 p.m., 4YA Dunedin on Thursdays at 12.35 p.m., and 4YZ Invercargill on Mondays at 12.33 p.m.

Pig Broadcast

Under the auspices of the Otago and Southland District Pig Council a broadcast will be delivered in June as follows:—

Dunedin—4YA and relayed to 4YZ, on June 13, "The Carcass Quality Scheme", by N. Macdonald, Supervisor, Otago and Southland District Pig Council.

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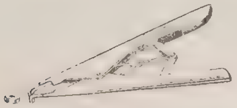
Calves



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Here are the facts reported by letter

D. E. Alexander,
Napa, California,
1555 Henry Road.
March 3, 1951.

Mr. Earl D. Schalaman,
C/- California Stockmen's Supply Co.,
San Francisco 5, California.

Dear Mr. Schalaman:

We applied Elastrator bands to 651 calves during November and December, 1950. Examination shows complete disappearance of horns. There were horns that had grown out a good 8 inches which demanded a little more care in installing the bands; those horns are gone.

Horns from 2½in. to 6in. long are much easier to apply than are the short ones. I would be very careful about applying the band too early or too late in the winter season on account of flies. One must always offer all the care and attention as in the usual form of dehorning. You should never just put the bands on, turn the calves loose and forget them.

Of the 651 head de-horned via Elastrator method we have observed 2 slightly bloody heads at the time the horns were rubbed off, about 6 weeks to 2 months after application. The first two hours after applying bands the calves were under noticeable distress, but following that period we could notice no discomfort.

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Above: *Pneumatic tyre and steel disc wheel with roller bearings.* Below: *Pneumatic tyre and steel disc wheel with plain bearings.*

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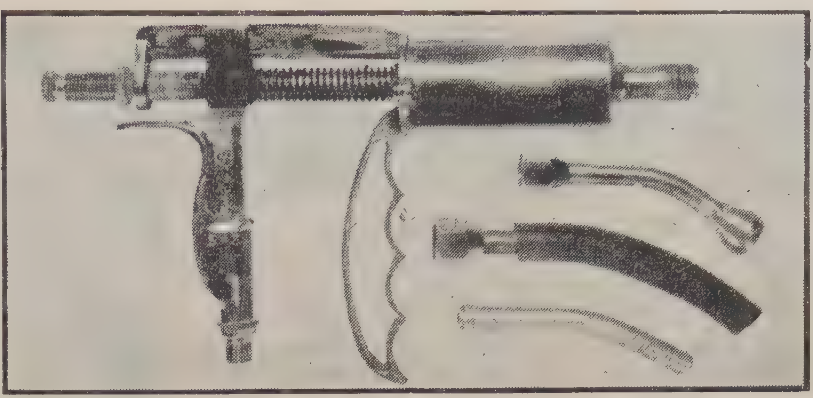
Danger through Faulty Use of Balling or Drenching Guns

By J. MULLINS, Veterinarian, Department of Agriculture, Masterton

LOSSES in lambs and in older sheep after inexpert or careless administration of worm medicine are still too frequent. Most of these losses are associated with the use of the balling gun in the administration of phenothiazine pellets. Apart from the occasional mortalities incurred, a number of lambs suffer a severe check through faulty technique or rough treatment. In the hands of the indifferent operator the balling gun can be a lethal weapon, serious injury sometimes resulting through pushing the barrel too far or too roughly into the throat and too forceful ejection of the pellet, or misdirection. The pellet has been found embedded in the soft throat tissues and in the windpipe on post-mortem examination of lambs killed through these causes. The lining of the throat is a delicate membrane, which is easily damaged and very subject to infection, extension of which readily takes place.



Drenching gun and nozzles. The upper nozzle is shaped to reduce the risk of injury, and the rubber on the middle nozzle serves the same purpose. The lower nozzle will readily cause damage.

VARIOUS types of balling gun are in use, but care must be exercised with all, especially the automatic or repeater type. A piece of soft rubber tubing attached to the barrel end is of some use in preventing gross damage to the throat where the gun is accidentally pushed too far or if it is pushed violently against the throat wall. The barrel end should be carefully passed back over the tongue to the entrance into the throat, a point which can be recognised or felt by the practised hand, and the pellet ejected. If it is felt that the barrel has been pushed too far into the throat, pull the gun back as gently as possible before ejecting the pellet. It may be a good practice to withdraw the gun a little at all times before ejecting the pellet, thus ensuring sufficient room for its ejection without forcing it against the back of the throat. The placing of the pellet in the throat cavity is all that is required; the involuntary act of swallowing directs the pellet into the gullet. If the pellet is not delivered far enough back into the throat cavity, it is not swallowed and is dropped out of the mouth later.

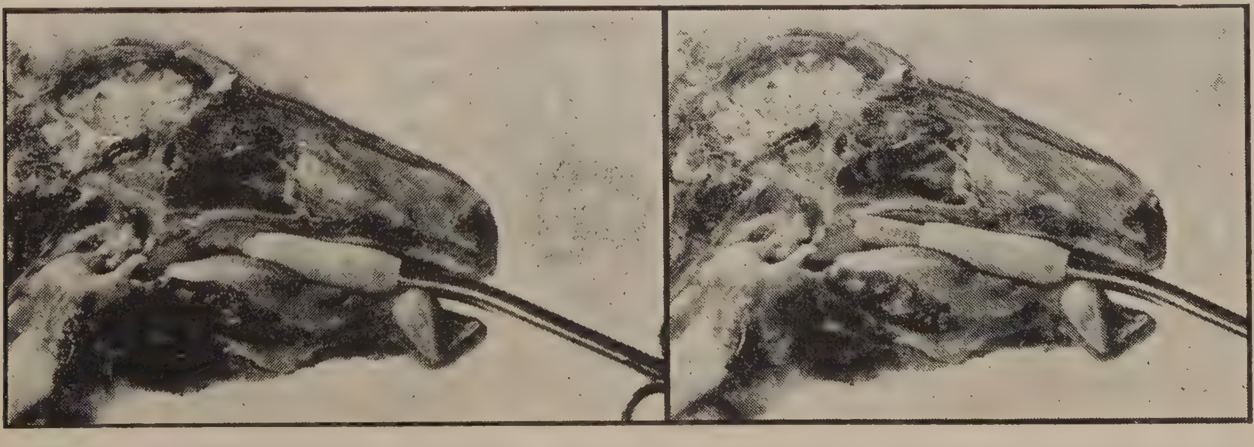
Complications Following Injury

When the throat is injured inflammation, infection, and abscess formation follow, the extent of which depends mainly on the severity of the injury. The abscess may extend back into the gullet or between the first two bones of the spinal column, causing paralysis, or it may involve the entrance to the windpipe, causing snoring or even pneumonia by extension or aspiration of pus. Death takes place in a few days or longer, depending on the seriousness of the injury and complications. Cessation of feeding, rapid loss of condition, paralysis, and distressed breathing may be the obvious symptoms. When only minor injury occurs temporary loss of condition and perhaps a cough or snoring may be noticed some time after dosing.

Injury to the mouth and throat can also occur in the administration of other preparations and forms of worm medicine. In dosing with bluestone-nicotine sulphate solution care must be taken that the lining of the mouth is not broken or damaged, as this preparation has a very irritant and caustic effect and may cause extensive destruction of the tissues, involving the bones, many affected cases eventually dying or requiring destruction. The nozzle of the gun or drenching instrument must not be allowed to lean or press against the inside of the lower jaw as sometimes happens.

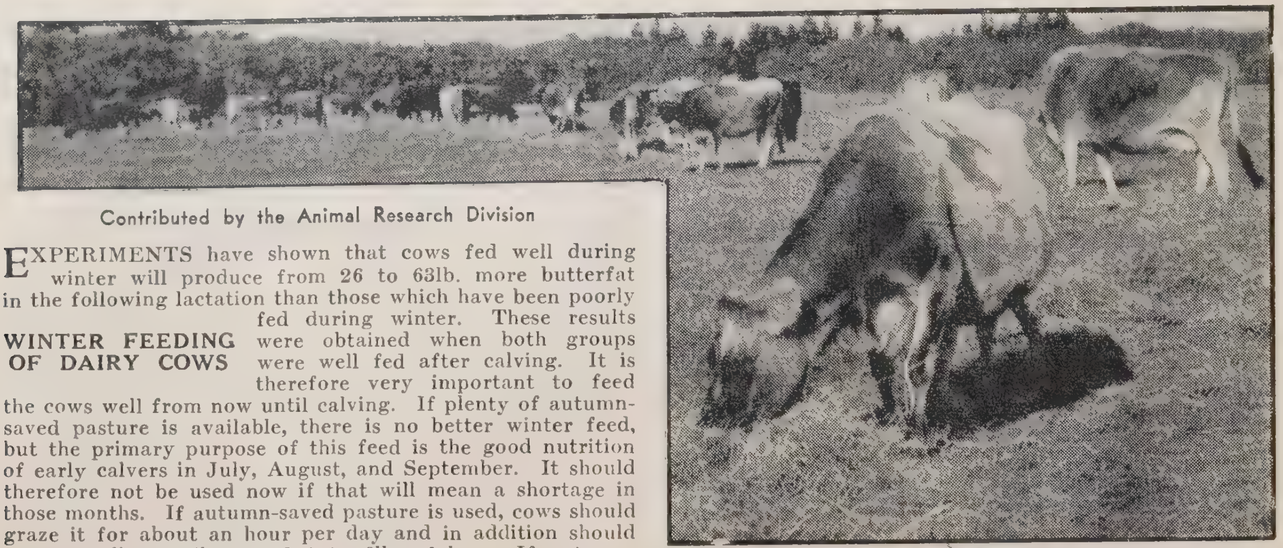
Greater Risk with Lambs

Care must always be exercised in the introduction of any foreign body or instrument into the mouth or throat. The animal is likely to object and the operator may use too much force. Nozzles and parts introduced must be faultlessly smooth and rounded; otherwise trouble is inevitable. Lambs tend to resist more than older sheep more inured to handling, so greater care and patience are necessary with lambs. Risk of injury is increased if the animal jumps forward during administration or if the operator is interfered with. Haste and fatigue make the operator lose facility; avoid these predisposing causes of dosing mortalities and losses.



Left—The correct position for the end of the balling gun. The gun is held to illustrate the technique of placing the pill in the throat; in practice the gun would enter from the side of the sheep's mouth. Right—The pellet fully expelled without being forced against the delicate membrane of the throat. The involuntary act of swallowing directs the pellet into the gullet.

CARE OF LIVESTOCK DURING JUNE



Contributed by the Animal Research Division

WINTER FEEDING OF DAIRY COWS

EXPERIMENTS have shown that cows fed well during winter will produce from 26 to 63lb. more butterfat in the following lactation than those which have been poorly fed during winter. These results were obtained when both groups were well fed after calving. It is therefore very important to feed the cows well from now until calving. If plenty of autumn-saved pasture is available, there is no better winter feed, but the primary purpose of this feed is the good nutrition of early calvers in July, August, and September. It should therefore not be used now if that will mean a shortage in those months. If autumn-saved pasture is used, cows should graze it for about an hour per day and in addition should receive 20lb. of silage and 4 to 6lb. of hay. If autumn-saved pasture is not available, cows should be fed as much hay as they will eat, certainly not less than 10lb. in addition to 20lb. of silage. If the winter is a mild one and good grazing is available, silage may be omitted, but ample hay should still be provided.

CARE OF SOWS

Sows and any wintered pigs should be fed on roots plus ½lb. to 1lb. of meat meal per day. Pigs should be kept out of the paddocks when the winter is wet, as pugging of pasture at this time of year will ruin it for spring and summer feeding. Sows due to farrow should be stied and fed what milk is available. After farrowing they should receive up to 5lb. of meal per day plus milk plus roots. Undue economy with meal at this stage will mean light litters at weaning.

LIVER FLUKE IN SHEEP

In areas where sheep become infested with liver fluke flocks should be drenched now. The only effective drug is carbon tetrachloride which should be mixed with 4 times its volume of liquid paraffin. The dose of the mixture is 5 c.c. for sheep of all ages and 1 gallon is enough for about 900 sheep. If only one treatment is to be given, the middle of June is the best time, but if sheep are already showing symptoms, a drench should be given immediately and repeated at the end of July. Further information about liver fluke in sheep and cattle will be found in Bulletin No. 248, which is available from the nearest office of the Department of Agriculture.

WORMS IN LAMBS AND CALVES

Worms are sometimes still troublesome in May and June, and if lambs or calves are not doing well, they should be drenched with phenothiazine at the full dosage rates recommended by the manufacturers. Further information about worms and drenching will be found in Bulletins No. 171 and No. 189, which are obtainable from the nearest office of the Department.

LICE ON POULTRY

Poultry lice can cause considerable loss of condition in birds and reduced egg laying. To control these parasites a fine trickle of 40 per cent. nicotine sulphate should be run along the perches on a calm night before the birds go to roost. Two or three treatments should be given at weekly intervals.

RICKETS IN LAMBS

Lambs in Canterbury and some other South Island districts frequently suffer from rickets when wintered on green oats or barley and occasionally this trouble is experienced on other types of greenfeed. It can be prevented by giving one dose of vitamin D at the beginning of winter. The best preparation is Calciferol and the dose is 25 mg. dissolved in the smallest amount of olive oil which can be given conveniently with the drenching apparatus available. Even when rickets does not occur, this treatment induces much better growth in lambs during winter. Further details and valuable advice on winter feeding of hoggets in Canterbury will be found in the December, 1946, issue of the "Journal".

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during March and for the 8 months ended March 31, 1951, with comparative figures for the same month and 8-monthly period of 1950, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period		Tons Creamery	Whey	Total	% Inc. or dec.	Total tons in store at end of mth.
March, 1951	..	12,930	303	13,233	—	39,940
March, 1950	..	11,122	305	11,427	—	34,793
Inc. or dec.	..	+1,808	—2	+1,806	+15.804	+5,147
For 8 mths. to 31/3/51	..	136,225	2,621	138,846	—	—
For 8 mths. to 31/3/50	..	133,256	2,527	135,783	—	—
Inc. or dec.	..	+2,969	+94	+3,063	+2,255	—

CHEESE

Period		Tons White	Coloured	Total	% Inc. or dec.	Total tons in store at end of mth.
March, 1951	..	9,621	7	9,628	—	30,093
March, 1950	..	8,022	2,378	10,400	—	28,774
Inc. or dec.	..	+1,599	—2,371	—772	—7.423	+1,319
For 8 mths. to 31/3/51	..	85,724	1,526	87,250	—	—
For 8 mths. to 31/3/50	..	66,858	18,816	85,674	—	—
Inc. or dec.	..	+18,866	—17,290	+1,576	+1,806	—

If these figures are converted into butterfat equivalent, there is an increase of 2.137 per cent. in butterfat graded for the 8 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Preparations for Tree Planting and Drainage

SEASONAL NOTES Contributed
by the EXTENSION DIVISION

PLANS for the preparation of land for next season's root and green forage crops and for tree planting and drainage work in autumn and winter should receive particular attention now.

* * *

TREE PLANTING

Preparations for the season's tree-planting programme which should be completed now include planning the position and type of plantation or shelter belt, the species and spacing of trees in the belt, ordering of trees from the nursery, completion of the fencing protecting the area to be planted, and the cultivation, if required, of the area.

CULTIVATION

When planting on tight turf or weedy areas is planned, more rapid tree growth will follow if the ground is ploughed previously and if necessary disced over just before planting to destroy competing weed growth such as heavy cocksfoot or fescue. In heavy soils ploughing should be done in late summer as soon as the ground softens, and the ground is then left to weather over winter; also, the pits for tree planting should be opened and the soil left on the edge to break down. If fern is sparse, no special preparation is necessary or at most clearing lines in thicker growth may be desirable, but heavily infested fern country to be planted is best cut or burnt late in winter, and followed soon by tree planting so that the trees can be established and begin growing before competition starts from heavy young fern growth.

TIME FOR PLANTING

The season to plant depends on local climatic and soil conditions: In general, planting in most North Island areas can proceed from May to mid-September; in the South Island planting conditions are usually better in spring. Spring planting on wet ground subject to heavy winds prevents the tree roots being loosened by constant swaying in winter gales and, as a general rule, wet ground likely to be disturbed by sufficient frost to throw out the small trees should be left until spring. Light land (such as sand dunes) which becomes dried up by hot winds should be dealt with in autumn and winter so that the trees may become established before the soil is dried out.

RULES FOR PLANTING

The roots of planting stock should not be allowed to become dry. When the trees are received they should be heeled in to await use and when they are being planted out they should be carried in a narrow tin or wrapped in damp sackcloth. Do not bend up the roots when placing the tree in the soil; make the pit or furrow as deep as the length of the roots. Place the tree at a slightly lower level than that at which it has grown in the nursery bed. Firm well the lower soil round the roots; in a clay soil only press it lightly with the foot. (Full information on the subject of planting is contained in the August, 1947, issue of the "Journal".)

* * *

DRAINAGE

SMALL drainage jobs are usually carried out in the winter when other work is not pressing and the soil is moist, easily dug, and the grade determined by the flow of water in the bottom of the trench. The advent of drain-cutting machines has greatly widened the period for undertaking tile drainage and these machines perform most efficiently when the land is relatively dry, provided of course the machine is worked to allow the drains to be dug to a predetermined grade.

DRAINAGE ADVISORY SERVICE

Four drainage advisory officers (one in each Fields Superintendent's district) have recently been appointed to advise on the planning of thorough farm drainage and farmers who require assistance should get in touch with their local Instructor in Agriculture.

LAYING TILES

When laying tiles in hand-dug trenches it is important to see that they are laid on a firm bottom, often a difficult job under muddy conditions. The trench should preferably be finished from the surface, using a push-type scoop with a long handle to make a shallow U-shaped groove to fit the tile, and the tiles laid with a tile hook to avoid walking in the trench or along the top of the newly laid tiles. In laying tiles care should be taken to ensure that no appreciable gap is left between them. Each tile can be fitted to its neighbour by rotating it to obtain the best fit.

JUNCTIONS

The junction of two tile lines should preferably be made with the special Y junction tiles obtainable. These largely do away with the time-consuming chipping and cutting of tiles to fit and make a better job. Where junction tiles are not used the lateral should be curved slightly to meet the main drain at an angle of about 60 degrees. Right-angle junctions slow down the flow of water and tend to cause silting of tiles at this point.

* * *

POTATO SPROUT INHIBITION TRIALS

RECENT experiments have shown that the sprouting of stored potatoes can be reduced by the application in powder form of certain chemicals evenly in the bags of tubers. Several ounces of powder are added to a bag of potatoes and the bag shaken well to ensure even distribution. The applied powder volatilises to produce gas which circulates among the tubers. The success of treatment depends to a great extent on retaining this gas among the tubers, for if permitted the gas will dissipate easily into the atmosphere without the required effect being obtained. Thus, potatoes so treated should be stored in double sacks or the sacks covered with some semi-airtight covering such as a tarpaulin. The chemicals used in trials were methyl ester of alphanaphthalene acetic acid, and tetra-chlor-nitro-benzene, which are available as commercial preparations under proprietary names. Potatoes for table use may be safely treated without fear of undesirable effects, but it is not recommended that tubers intended for planting be so treated unless the treated tubers are exposed to the air for about a month before planting to enable the chemical to dissipate completely.

* * *

SUBTERRANEAN GRASS CATERPILLAR

MEASURES to control subterranean grass caterpillar should be taken as soon as damage is apparent. The new insecticides B.H.C. and D.D.T. have both proved effective.

Though B.H.C. is preferable, it is not available in adequate quantities and therefore it is necessary to rely mainly on D.D.T., which is immediately effective on subterranean grass caterpillar and in the second season will control grass-grub as well. The quantity to use depends on the concentration of D.D.T. Farmers should ascertain the concentration of the material which they purchase and adjust this application so that the equivalent of 2lb. per acre of pure D.D.T. is sown.

D.D.T. is available as a D.D.T.-superphosphate mixture and in various concentrations of D.D.T. powder.

The mixture is most efficient when applied to closely grazed, dry pastures.

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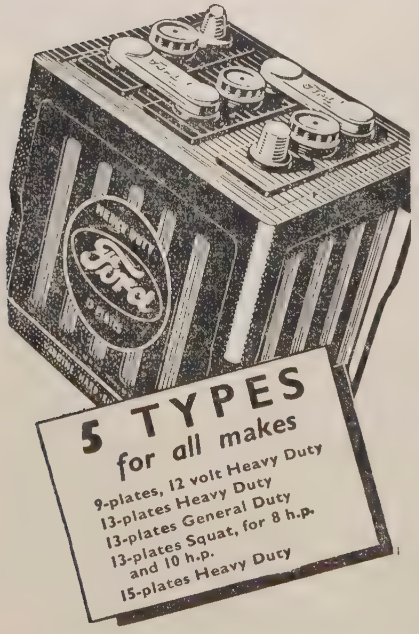

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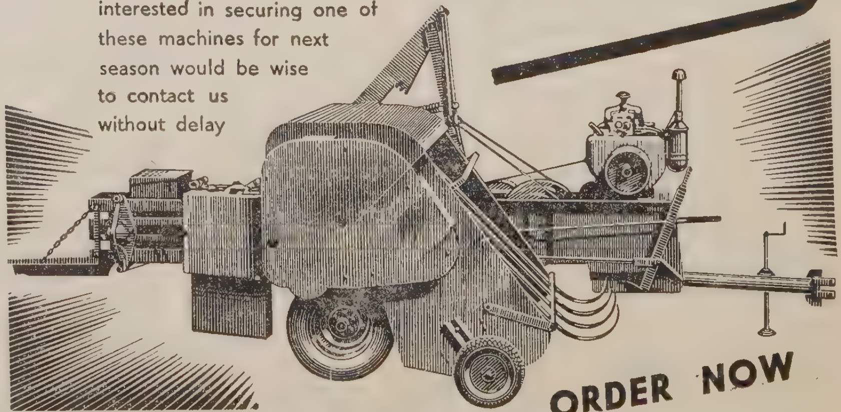

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HEADING PHOTOGRAPH: Aerial view of chemical works at Mapua. The inspection depot and wharf sheds are in the background. A. R. Kingsford photo.

Manufacture of Spray Chemicals at Mapua

By D. J. HOGG, Orchard Instructor, Department of Agriculture, Mapua

THIRTY or 40 years ago when extensive commercial orchard plantings reached a peak the bulk of spray chemicals required for control of insect pests and fungous diseases were imported, principally from the United Kingdom, Australia, and the United States of America. Lime sulphur solution, however, was made by a few local manufacturers, but most fruit growers prepared their own supplies. Even in the late 1920's fairly substantial quantities of wettable sulphur of British manufacture and lime sulphur solution of Australian manufacture were imported. Since 1940 almost all the Dominion's requirements of colloidal sulphur and some of the lime sulphur have been manufactured by the Fruitgrowers Chemical Company Ltd. at Port Mapua, a company founded in 1932. A variety of sprays and dusts of importance in fruit and vegetable production and in general horticulture are now being processed. In this article these products and the manufacturing processes used are discussed.

UNTIL the therapeutant certification scheme was introduced by the Plant Diseases Division of the Department of Scientific and Industrial Research in 1935 there were no clearly defined standards of quality for spray chemicals. Some products manufactured overseas were shown to be ineffective under New Zealand conditions.

With the introduction of the voluntary certification scheme manufacturers or their agents submitted samples of their products, together with particulars of composition. From time to time lists of approved materials were circulated for the guidance of users after bio-assay of the products by plant pathologists of the Plant Diseases Division and chemical analyses by chemists of the Dominion Laboratory. The quality of the approved products offered by manufacturers or their agents is checked periodically by examination of samples collected in the field and from merchants' stocks.

New Specifics

Until 1930 most orchard spray programmes for control of fungous diseases were based on copper (Bordeaux mixture) and sulphur (lime sulphur solution and various wettable sulphurs). The principal insecticidal materials at that time were arsenate of lead, nicotine, and miscible and emulsified petroleum oils. Today all of the fungicidal and insecticidal materials mentioned are used, but many new specifics have been introduced and old ones have been improved or modified.

New insecticidal materials based on selenium and various organic products such as D.D.T. (dichloro-diphenyl-trichloroethane), D.D.D. (dichloro-diphenyl-dichloroethane), B.H.C. (benzene hexachloride), and H.E.T.P. (hexaethyltetraphosphate) have been introduced. The products of chemical industry such as technical D.D.T. and sulphur are unsuitable for protecting plants in the crude state. Considerable processing and additions of various adjuvants are needed before the materials are suitable for use as insecticides or fungicides.

Organic fungicides such as "Phygon" (2, 3-dichloro-1, 4-naphtho-quinone) and "Fermate" (ferric dimethyl dithiocarbamate) have been used experimentally.

Processing Industry

It is unlikely that the small quantities of highly complex organic compounds required for the Dominion's horticultural needs can be synthesised economically in New Zealand. As an alternative, during the last few years a processing industry based on imported crude chemicals has developed. The plant is at Port Mapua, Nelson, and is owned and operated by the Fruitgrowers Chemical Company Ltd. and an associated company, Lime and Marble Ltd. Operations were begun in 1932 when lime sulphur solution and miscible winter spraying oils were produced. During 1933 a lime kiln was established at Takaka Hill to calcine high-grade quicklime needed in the manufacture of concentrated lime sulphur solution. During 1937 the company built a small experimental pilot plant for the production of colloidal sulphur suspension, which at that time was being imported from the United Kingdom and Germany. The product was certified by the Plant Diseases Division and introduced to the New Zealand market during 1938.

During 1945 a micronising or air jet pulverising plant was erected. By 1947 large-scale production of D.D.T. dusts and concentrated wettable powders was undertaken.

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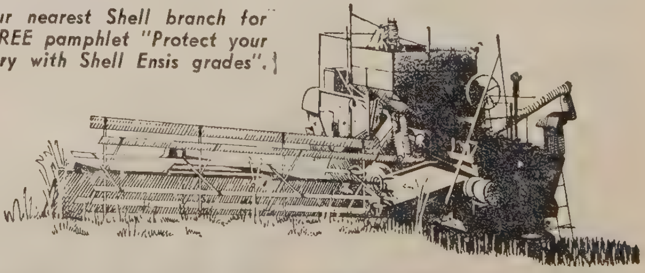

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Since the company was founded a works laboratory has been maintained for routine testing and the development of new spray chemical formulations. Considerable investigational work has been carried out in establishing new processing methods.

Today the following products are manufactured at Port Mapua: Lime sulphur solution, colloidal sulphur suspension, dusting sulphur, hydrated lime, D.D.T. dusts, wettable concentrated D.D.T. powders, D.D.D. dusts, wettable D.D.D. powders, and winter and summer spraying oil emulsions. Rotenone dusts are produced for home garden and D.D.T. solutions are made for household use.

Products and Methods of Manufacture

Products and their methods of manufacture are:—

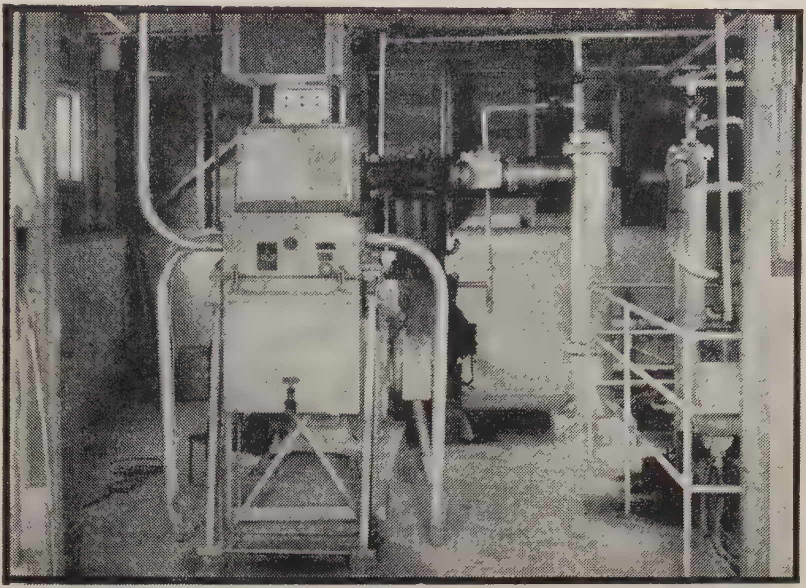
Lime sulphur solution: This material is a clear amber colour and has a specific gravity of about 1.2. The active fungicidal principal is a mixture of calcium polysulphides. The product contains 15 per cent. by weight of sulphur as polysulphides.

The solution is prepared in a steam-heated and mechanically agitated digester by the interaction of a high-calcium quicklime with a commercially pure grade of ground sulphur. Quicklime containing an appreciable percentage of magnesium is unsuitable and a local quicklime prepared by calcining white marble has proved entirely satisfactory. After cooling and clarification the clear lime sulphur solution is packed in 45-gallon drums and 4-gallon tins.

Colloidal sulphur suspension: The product is marketed as a white paste in two strengths, one containing 25 per cent. sulphur and the other 40 per cent. sulphur. The product is formulated with a wetting agent to ensure wetting of plant surfaces by the dilute suspension, a dispersing agent to prevent particles adhering, and a suspending agent to prevent settling and packing of the solids when the product is stored in the concentrated state. The dispersion is marketed in wax-lined wooden barrels.

[*A. R. Kingsford photo.*

Filling barrels with colloidal sulphur and weighing them.



[*A. R. Kingsford photo.*

Part of air-compressing equipment used to operate the micronisers.

The average size of the sulphur particles in the product is approximately 0.5 micron (1 micron = 1/25,400in.). The total surface area of 1 gm. of sulphur in this finely subdivided state is approximately 110,000 sq. cm., or, expressed in other terms, the surface area of 1lb. of sulphur in the colloidal-suspension state is more than 1 acre. In this finely dispersed state sulphur loses its yellow colour and is milky white. The smallest particles are not visible under the microscope, and most of those which are visible exhibit active Brownian movement and are freely dissociated.

Size-reduction plant of a highly specialised type has been developed to achieve disruption of sulphur to substantially sub-micron sizes. Dispersion results from the treatment of sulphur in fluid medium at high velocities under carefully controlled conditions. The choice of materials for the plant and equipment is limited by the highly corrosive action of finely divided sulphur on many metals. Stainless steel, rubber, wood, and corrosive-resisting cements are employed extensively. Ordinary galvanised pipe and fittings would last for a few days at most where concentrated suspensions of colloidal sulphur are handled.

Considerable tank space is required for storing suspensions and solutions. Certain New Zealand timbers, notably silver pine, have been found to be satisfactory for vats.

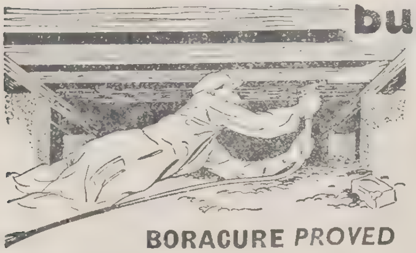
Low-cost electric power is essential for economic operation of the process, a feature of which is that the colloidal dispersion system operating has been evolved progressively within the organisation of the Fruitgrowers Chemical Company Ltd. Some novel and unique equipment has been fabricated by New Zealand engineering firms for the company.

Micronising Plant and Products

The microniser or jet pulveriser is a fine-grinding and classification system originally developed in U.S.A. for the production of materials in an extremely fine powdered state. Generally the materials treated are size reduced so that the average particle size is 5 to 10 microns (325 mesh=44 microns). The equipment at Port Mapua is the only installation of its kind in New Zealand or Australia. This grinding system employs high velocity air jets and the machine has no moving parts. When the materials being treated are not heat sensitive, superheated steam can be used for operation instead of air. A small machine 20in. in diameter may require 150 h.p. as compressed air. This relatively large release of energy in a confined space results in the shattering of materials under treatment into minute particles. Although the machine has no moving parts, the contents whirl at great speed (approximately 1200 m.p.h.). Violent impacts between particles cause disintegration, and particles which are reduced to a very fine state are entrained in the air stream and floated to a cyclone settling chamber. Coarse particles are held in the machine by centrifugal force and retained until abrasion and attrition cause complete grinding.

Auxiliary devices are used in conjunction with the microniser mill, such as raw-material feeding equipment designed to supply raw material at a constant rate, and dust filters recover any

How to rid your home and farm buildings of borer!



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BORACURE ***PROVED*** **EFFECTIVE!** In tests of various borer preparations, entomologists of the Department of Scientific & Industrial Research proved pentachlorphenol (Boracure) to be a first rate borer treatment toxic and demonstrated its superiority over many other specifics. See "Tests with Timber Preservatives in New Zealand", by J. M. Kelsey. The N.Z. Jnl. of Sc. & Tech., Vol. 27, May 1946, P.446. Home treatment and haphazard squirting with an oil can at flight holes is only playing with the problem. Skilled treatment is essential—BORACURE treatment. Our experience goes back to the pioneering of timber preservation in 1930. Today we lead the field.

Borer is rampant in New Zealand! Day and night it goes its destructive way, riddling your home, woolsheds, barns, stables, furniture with its unsightly holes. It depreciates the value of your property! It weakens strong-looking timbers until they are dangerous! It creates an objectionable musty odour. It causes perpetual irritating dust. It ruins furniture and will eat right through linos and floor coverings. **Get rid of it from YOUR property and prevent it returning. Protect clean property from infestation.** How? There is only **one way** that is really satisfactory and has been **proved effective** by over 20 years' practical application and by laboratory research — BORACURE!

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It costs nothing to have a Boracure Inspector look over your property and give a comprehensive, unexaggerated written report on its condition. Just mail the coupon below. There's no fee, no obligation.

Property Inspected Regularly for 5 Years

Our Insulation Plan covers complete treatment to all accessible parts of the property, with 3 further inspections and treatments (if required) within 5 years. You pay only part of the cost to begin with and keep balance to pay as future services are done. Or you can have a specific portion only of your property treated for a stipulated sum, without further servicing.

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THOUSANDS OF PROPERTIES BORACURE-PROTECTED IN N.Z.

BORACURE GUARANTEED!

Boracure treating fluids are **guaranteed to kill borer, rot fungi, etc.** They are **guaranteed to remain effective for the life of the property.** Grubs die on eating Boracure treated timber, beetles won't lay eggs on it.

Boracure (N.Z.) Ltd. have treated thousands of properties of every description — homes, farm buildings, factories, grandstands, etc. — and new friends are being made every day.

- We have saved farmers alone colossal replacement costs by eradicating borer from woolsheds, barns, stables, hay lofts, garages, etc., threatened with collapse by borer. We saved one farmer in Springfield £1,000 by Boracuring his woolshed instead of rebuilding it. This is only one of hundreds of similar cases. What we have done for them we can do for YOU!

Mail Coupon NOW! Borers don't wait! They go on . . . eating . . . eating . . while **your** property suffers! Give them a sock they'll never recover from—a Boracure treatment.

BORACURE (N.Z.) LTD., Head Office,
105 Customhouse Quay, Wellington.
I would like your Inspector to give me without obligation, a free report on the borer condition of my property.
Name ....
(Print in BLOCK letters please)
Address .... J.A.

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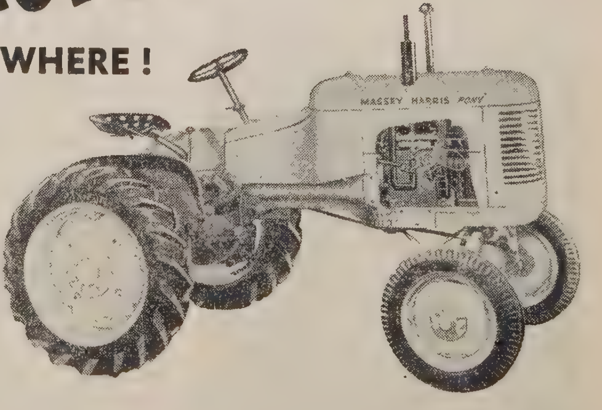

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Flexible Power 4-cylinder engine—Does the work of a 2-horse team—and more. Sturdy 3-speed Transmission (2.74 to 7 m.p.h.).
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Equipment includes hydraulic pump and control valve for attached implements, self-starter, muffler, draw-bar, combined P.T.O. and pulley, lights and wheelweights.
Ideal for market gardeners, row-crop farmers, and as an extra tractor for the large acreage farmer.

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solids escaping in the air flow from the powder settling chamber.

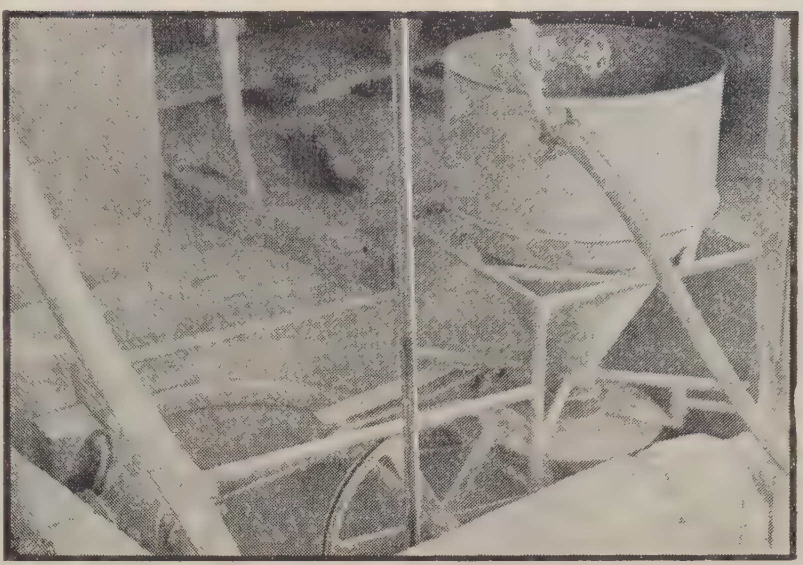
Electric motors ranging from 25 h.p. to 75 h.p. operate the necessary air compressors. Each air-compressing unit is fitted with an after-cooler to chill the hot compressed air and eliminate moisture from the supply lines. Large-capacity air receivers are necessary for levelling out slight fluctuations in air pressure and an air filter is provided for removing oil vapour escaping from the compression equipment.

Horticultural Products Processed

A number of materials are treated for use in various New Zealand manufacturing industries, but some products processed for horticultural use are as follows:—

Hydrated lime: This material is an ingredient in Bordeaux mixture and is used in combination sprays when arsenate of lead is used with lime sulphur solution to prevent damage to fruit and foliage. Because high-pressure pumps are used in conjunction with fine spraying nozzles, it is essential for the protection of wearing parts of the equipment that hydrated lime used in spray mixtures shall contain a minimum of gritty abrasive particles. To achieve high quality considerable processing is required. Slaked lime is prepared by water slaking high-grade quicklime. Subsequently the dry hydrate is passed through a mill and air-floated to pulverise the materials to about 200 mesh and to eliminate "unburnt" lime and other hard impurities. The pulverised hydrate is then processed by the microniser to yield a product more suitable for orchard spraying.

D.D.T. dusts: When dusts are used instead of liquid sprays inert mineral fillers replace water as the vehicle. For this purpose several Nelson non-metallic minerals, including china clay, calcium carbonates, and talc-bearing minerals, are processed at Port Mapua. Considerable preparation of these raw materials is necessary before admixture with the active insecticidal material and micronising. China clay which is mined in the Takaka district is kiln dried, crushed, and air-floated. Talc-bearing rocks which are mined near the Cobb Valley are roughly crushed at the company's Takaka Hill limeworks and later pulverised and air-separated at Port Mapua.



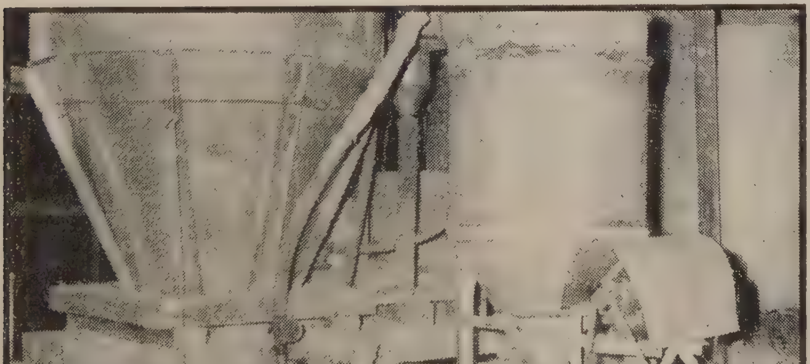
[*A. R. Kingsford photo*

Rotating plate feed used for feeding D.D.T. at a constant rate to the micronising process.

For market garden use D.D.T. dusts normally contain 2 per cent. active principal (D.D.T. para para isomer). The inert mineral diluent is intensively blended in batches with the required quantity of technical D.D.T. in a mechanical mixer before passing through the microniser for final size reduction.

Concentrated wettable D.D.T. powders: Technical D.D.T. normally contains 75 to 80 per cent. of the insecticidally active para para isomer. The crude chemical may be coarsely granular and somewhat waxy, having a melting point of about 89 degrees C. Materials of this type can seldom be ground satisfactorily in ordinary high-speed, fine-grinding hammer mills, which produce heat. In the microniser the drop in the temperature caused by the expansion of compressed air through the grinding jets offsets frictional heat caused by impact and attrition of particles being ground. Technical D.D.T. alone, however, is too tacky to be ground. Usually wettable D.D.T. powders contain 50 per cent. D.D.T. para para isomer. To enable the production of a concentrated wettable 50 per cent. p.p.i. powder (which may contain as much as 66 per cent. technical D.D.T.) an inert filler is added to act as a grinding aid and prevent subsequent caking of the product. So that the product may be easily mixed with water to form a suspension, a surface-active or "wetting" agent is included in the mixture.

D.D.D. dusts and wettable powders: D.D.D. (dichloro-diphenyl-dichloroethane) is an analogue of D.D.T. and performs in much the same manner. A great advantage claimed for this material is that it is much less toxic to warm-blooded animals. Consequently where there is any possibility of a



[*A. R. Kingsford photo.*

Part of colloidal sulphur mixing plant.

residue hazard D.D.D. is preferred. The manufacturing method is as for D.D.T. dusts and powders.

Rotenone dusts: Pre-ground derris and cube roots have been further size reduced in the microniser, either alone or in conjunction with suitable diluents. For market or home garden use derris dusts contain from 0.5 to 0.75 per cent. of the active rotenone principal, whereas the natural root contains from 4 to 5 per cent., which is unnecessarily concentrated for field use.

Dusting sulphur: Although mechanical grinding mills usually require the introduction of an inert gas to prevent explosions, sulphur can be ground safely in a microniser. As there are no moving parts, the chance of a spark initiating an explosion is remote. In any case the hazard is very slight due to the small internal volume of the equipment.

Finely ground pure commercial-grade sulphur is unsuitable for dusting. Very finely ground sulphur without additions tends to agglomerate or cake when left standing. Small quantities of conditioners are used to reduce the electrostatic charge acquired by sulphur caused by the friction of grinding. Micronised dusting sulphurs are prepared in a free-flowing state suitable for use in hand or power dusters.

Spraying oil emulsions: Two types can be manufactured. Winter spraying oils are prepared from a red oil of suitable viscosity. Summer spraying oils are manufactured from a highly purified white oil of medicinal quality. As small quantities of unsaturated hydrocarbons can be strongly phytotoxic of foliage and fruit, the specifications of a petroleum oil for summer use are stringent.

To prepare an emulsion a small quantity of water in which is dissolved an emulsifying agent is premixed in a high-speed propeller mixer. Where necessary a homogeniser is available for final stages of emulsification.

Spraying oil emulsions are formulated so that they are stable when stored but reasonably quick breaking when diluted for spraying, so that excessive "run-off" of oil droplets after spraying is avoided.

Agricultural lime: Some agricultural lime is produced at Mapua works as a by-product from the manufacture of white marble terrazzo chips and whiting.

General Works Facilities

Several auxiliary facilities are required for the Port Mapua enterprise. A spare parts store provides for almost all possible plant breakdowns as well as normal maintenance.

An engineer's workshop, equipped for normal plant maintenance, includes both electric and gas welding plant.

A cooper's workshop maintains the company's supplies of wooden kegs and barrels. Both oak and white pine timbers are used.

A 500 kva transformer serves the whole plant from a central location. The total connected horsepower of the electric motors used in various processes is approximately 500.

The small quantity of steam required is supplied by a 16 h.p. multitubular boiler fired with an automatic stoker designed to utilise slack coal.

The plant is reticulated with water and compressed air piping. Several pumping units from local wells provide ample cooling water for various processes. Where necessary, ventilating ducts withdraw dust or fumes through a continuously operated suction fan.

A recent addition is a new building to house small-scale or pilot plant used in experimental operations. In this section new products are developed and new applications found for processes which are already operating on a larger scale.

A warm floor and a hot-air kiln are available for drying operations. A jaw crusher is used for primary crushing. A swing hammer mill with vibrating screens is used for chipping and sizing some materials and a bag-cleaning machine has been installed for treating and cleaning empty returned sacks. A ball mill, charged with 900lb. manganese steel balls, has been set up for continuous operation.

Transport

Though the port of Mapua is adjacent to the works, sailings from Mapua do not provide a full coverage of the Dominion; consequently some of the plant's manufactures are shipped from Port Motueka and Nelson as well as the local port. Incoming raw materials are received from the three Tasman Bay ports. Products such as D.D.T., D.D.D., and colloidal sulphur are widely distributed throughout New Zealand to all the principal fruit-growing areas.

Several quarries are operated in the Nelson Province for the supply of mineral raw materials for the Port Mapua mills.

Future of the Industry

Very high standards of quality have been set by the Plant Diseases Division of the Department of Scientific and Industrial Research and the Horticulture Division of the Department of Agriculture. All the main lines of the company have been accepted under the certification scheme.

Many of the unit operations carried out at Port Mapua relate to size reduction of fungicidal and insecticidal materials either as micro-particle powders or as colloidal suspensions. With the advent of airflow spraying machines for the application of conventional dilutions as well as concentrate and semi-concentrate sprays, it is expected that fine particle subdivision of all insoluble spray preparations will be of increasing importance. It is probable that future operations at the Port Mapua plant will be confined chiefly to preparing and formulating chemicals as distinct from manufactures which involve complex chemical plant and processes. It is thought that the novel colloidal suspension process and micronising process may have many useful applications in the development of new materials still in the experimental stage.

Acknowledgments

The assistance of Mr. T. J. McKee in supplying information about materials used and technical processes of manufacture is acknowledged.

METEOROLOGICAL RECORDS FOR MARCH

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	64.4	+ 1.0	78.2	46.0	2.63	9		1.14	12	205.5
Auckland	160	66.8	+ 1.9	79.2	52.9	1.40	9	— 1.79	0.41	22	210.0
Tauranga	10	64.8	+ 2.3	77.7	48.2	0.92	5	— 3.15	0.39	21	226.9
Ruakura	131	61.2	+ 0.0	80.9	38.6	0.82	7	— 2.28	0.44	23	215.4
Rotorua	980	62.4	+ 2.5	78.6	44.6	1.77	5	— 1.80	1.08	23	204.5
Gisborne	12	63.4	+ 1.3	83.1	43.2	4.40	15	+ 0.72	1.17	25	204.3
New Plymouth ..	160	62.4	+ 1.4	73.8	47.0	3.10	12	— 0.56	0.80	1	193.8
Napier	5	63.0	+ 0.7	84.4	47.0	2.79	12	+ 0.12	1.08	25	185.8
Karioi	2125	58.0	+ 3.9	77.0	38.0	2.16	8	— 0.12	1.51	11	
Wanganui	72	62.6	+ 1.5	80.5	43.4	2.20	9	— 0.22	0.81	11	192.5
Palmerston North .	110	62.4	+ 2.1	82.5	42.0	1.94	10	— 0.45	0.72	23	177.1
Waingawa	350	60.8	+ 2.0	83.0	41.3	2.89	12	+ 0.88	0.89	23	176.2
Wellington ..	415	60.3	+ 1.1	74.3	45.7	5.38	10	+ 2.35	2.66	23	169.7
Nelson	24	61.8	+ 1.6	75.1	45.0	7.14	10	+ 4.21	2.50	22	204.7
Blenheim	12	59.8	— 0.6	80.9	37.9	3.39	7	+ 1.68	1.42	31	242.2
Hokitika	12	59.4	+ 2.9	71.1	41.0	6.01	13	— 3.36	1.73	22	184.8
Hanmer Springs ..	1225	55.2	— 1.0	85.8	28.0	5.32	11	+ 1.88	2.02	31	192.1
Christchurch ..	22	58.2	+ 0.2	81.3	37.2	4.03	8	+ 2.07	1.42	1	185.5
Timaru	56	57.6	+ 0.2	81.8	36.2	3.00	9	+ 0.81	0.76	1	155.0
Ashburton	323	56.6	— 0.7	86.0	33.2	6.00	12	+ 3.81	1.53	1,31	176.5
Alexandra	520	59.4	+ 2.1	89.0	31.9	0.72	8	— 0.43	0.22	10	184.9
Taieri	80	56.0	+ 0.8	93.5	31.1	3.40	14	+ 1.14	2.32	10	172.6
Invercargill ..	32	56.4	+ 2.2	85.5	34.0	3.34	14	+ 1.03	1.17	10	159.9

The Repairing of Concrete Paving

CONCRETE paving in milking sheds and other parts of the farm subject to heavy traffic may deteriorate badly because of unsound initial concreting. Floors should not disintegrate from corrosive action of milk acids, nor should there be excessive wear if they are made from suitable concrete mixtures and are properly looked after during the early curing period. Where deterioration has taken place repairs should be made as opportunity offers, and in this article H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, explains how these repairs are done.

WHERE a whole area is badly worn it is preferable to repave all of it with suitable concrete, either building over the old concrete to a minimum thickness of 2in. or removing the old concrete and starting again with a new pavement at least 3in. thick.

If the old work is built over, any holes in it should first be levelled up with No. 2 concrete, which should be allowed to set before repaving is begun. (The making of two types of concrete, Nos. 1 and 2, was described in "The Preparation of Concrete for Structural Use", published in the November, 1949, issue of the "Journal". The laying of concrete paving was dealt with in "Concrete Paving and Pressure-resistant Structures" in the February, 1950, issue.)

If the milking shed is repaved, the important area where milk may often get on the concrete (say, a strip 5ft. wide along the shed) should be done with No. 1 concrete. The rest of the paving may be done with No. 2 concrete, which will withstand normal wear, but will not resist milk acids.

If the concrete is laid in cold weather or in very dry weather, it will pay as an extra precaution to dissolve some commercial grade calcium chloride in the mixing water for all concrete. This ensures sounder maturing, as it both accelerates the rate of hardening and prevents too rapid drying. The correct proportion to use is about 2 per cent. of the weight of cement or 1⅞lb. to each bag of cement (94lb.). The calcium chloride must be dissolved and added to the mixing water. (Most freezing works use calcium chloride in their freezing process and advice about where it may be procured should be available at one of these works.)

Patching

Moderate cases of deterioration may be repaired by patching and worn areas restored by applying a ½in. hard mortar top. This will be successful only on floors or yards where the existing concrete, though worn and somewhat pot-holed, is still fairly hard and not crumbling away.

Before patching is begun the whole area should be washed and broomed. Pot-holes which need more than 1in. of make-up to the old level should first be cleaned out and made up to the surrounding surface. These patches should not be restored to a "feather-edge", but the old concrete should be chipped away so that the patches will be at least 1in. deep around their edges.

The old concrete must be thoroughly damp but free from water puddles before the prepared holes are filled with No. 1 concrete. Some dry cement should be sprinkled on the old wetted concrete in the holes and worked into a stiff paste with a wetted brush or broom. This will act as a sticker coat for the patching concrete.

When the new concrete in the patched holes has almost set (say, in about 4 hours) it is roughened and the stone particles exposed by brushing vigorously with a stiff broom. The restored patches should not be allowed to become dirty before the application of a mortar top to the whole area. In hot, dry weather they should be kept damp while waiting for the mortar top.

The unpatched areas should be slightly broken on at least 25 per cent. of their surfaces by chipping. This can be conveniently done with an old, heavy, long-handled wood axe, the gripped end of the handle being kept low down to the concrete to avoid jarring the hands.

After the chips are swept away the whole of the old concrete is thoroughly saturated, the aim in resurfacing being to ensure that the surface is damp but contains no puddles.

Grip Coat

The next step is to apply the grip coat, which is made by mixing together, without water, 2 parts of sand and 1 part of cement. The sand for this must be very coarse, ranging up to ¼in. particles and the same as that used in the mortar top, the making of which is described later in this article. Enough of this dry mix barely to cover the concrete should be sprinkled on and worked to a stiff, sticky condition by brushing and dabbing vigorously with a stiff broom wetted as required.

The water for wetting the broom should contain commercial grade calcium choride in solution at 5lb. to 4 gallons.

The abrasive action of working up the grip coat in position with the broom nullifies any surface dirt that could not be washed away and causes the new cement to "bite" into the old concrete. Thus a fresh but rough surface is provided to which the mortar topping can adhere securely.

The broom should be rinsed occasionally in water to prevent mortar setting in it, but surplus washing water should be shaken out before re-using the broom.

The grip coat must not be made sloppy, and if some parts are too wet, a little more of the dry mix should be sprinkled on and brushed in. Not more of the dry mix should be made or sprinkled on than can be worked up with the broom within an hour.

As the finished grip coat begins to stiffen on any portion it should be lightly dabbed and brushed with a soft broom to remove any surface glaze so that it will dry with a rough, granular appearance.

The grip coat should be allowed 24 hours to harden before the topping mortar is applied, but it will not matter if it is left longer, provided traffic is kept off it so that it will not become dirty. Boards should be placed over it to carry any unavoidable traffic.

New Mortar Top

Before applying the mortar top it is as well to try over the whole area first with a straight-edge and spirit-level, placing tiny pieces of wood at about 5ft. centres to represent the desired finished levels, with due regard to drainage fall and allowing for at least ½in. of topping.

The topping mortar should be laid in strips about 5ft. wide between steel screeds laid down and packed to the true levels previously decided. For these edge screeds it is desirable to procure two pieces of steel bar not less than 5ft. long, ⅜in. thick, and 1in. or more wide. A 4in. x 1in. wooden straight-edge 6ft. long and shod with a ⅛in. strip of steel on the bottom edge should be procured for striking off the surface between the edge screeds. The fairly stiff mortar, the composition of which is set out in the table below is spread on with a shovel, slightly too high, then beaten down by tamping with the straight-edge, followed by striking off with a slightly sawing action of the straight-edge.

About 2ft. ahead of the mortaring and just before its application a little of the same mortar mix should be scattered and brushed vigorously into the surface with a stiff, slightly wetted broom, or it may be beaten in with a stiff banister brush.

QUANTITIES OF MATERIALS NECESSARY FOR 100 sq. ft. OF MORTAR TOP WITH GRIP COAT

Rapid-hardening cement	2⅔ bags
Sand (graded from fine up to ¼in., or half fine sand and half clean metal sand ⅛in. to ¼in. dust freed)	7½ cub. ft.
Commercial grade calcium chloride	5lb.

The average thickness allowed for is 3/16in. grip and ⅝in. mortar top.

When the mortar surface is losing its water sheen (about an hour after laying) it should be worked over with a steel float operated from a kneeling board and with a toe board to prevent marking. If a non-slip surface is desired, the steel floating should be followed by a light rub over with a wooden float.

If work has proceeded sideways to leave one of the steel edge screeds embedded, the screed should be lifted out as soon as it is done with for screeding and the space should be filled with mortar well chopped and worked in with a trowel. This should be done well ahead of the final floating.

Curing the Mortar Top

If the mortar has been made with rapid-hardening Portland cement and with calcium chloride in the mixing water, it will mature satisfactorily without further attention except for giving it a swill over with water at sundown, and it should be hard enough for normal use in 3 days in warm weather or in 7 days in cool weather. However, in very cold weather, approaching frosty conditions, such work should not be undertaken.

Mortar Mix for Topping

To make the mortar mix for topping, mix with each bag (94lb.) of rapid-hardening Portland cement not more than 3 cub. ft. of sand, using not more than 4½ gallons of mixing water.

The sand must contain coarse particles ranging up to ¼in. If such a natural sand is not available, use about half fine sand and half clean crusher sand free from dust and ranging between ⅛in. and ¼in.

Thoroughly mix the cement and sand dry and then wet, continuing mixing and chopping with a shovel until colour and texture are even. The mixed mortar should show no signs of flowing, but should be just past the mealy stage, so that when pressed in the hands a firm ball with a "tacky" surface that will just cling to the hands may be formed.

If this condition cannot be obtained with 4½ gallons of mixing water to a bag of cement, the sand has too great a proportion of "fines", which should be reduced in favour of more coarse material. Or, if a natural fairly coarse sand is being used (without added coarse material), it may be satisfactory merely to reduce the total quantity of sand, perhaps to 2½ cub. ft. instead of 3 cub. ft. so that the mix will work with 4½ gallons of water.

Any mixed mortar must be used up within an hour.

Mortar cannot be satisfactorily mixed in an ordinary concrete mixer. Stiff mortar, as required for floors, should generally be mixed with shovels.

The 4½ gallons of water recommended for mixing a one-bag batch of topping mortar should have 1⅞lb. of commercial grade calcium chloride dissolved in it.

Reference

"Concrete Information", issued by the New Zealand Portland Cement Association.

TRAINED timber men know the risks involved in using mechanical saws better than do most farmhands or farmers who are engaged on this work only during slack periods, and every year a large percentage of farm accidents in New Zealand is caused by circular saws. The first precaution with a circular saw is to have adequate guards with both upper and lower portions kept in place so that knees as well as hands do not suffer if a foot slips suddenly. A person cutting wood should never allow his mind or eyes to wander from the work; if he must answer some one who speaks to him, he is wise first to stop cutting and draw back the swinging frame and wood clear of the saw, even if the frame may shake. A portable saw should be pegged down rigidly before work is begun and repegged if the bench or frame shakes or lifts. The operator should never allow his feet to become cluttered with cut wood and thus increase the chance of stumbling against the saw. Logs not completely cleaned of twigs or branches are dangerous to the eyes. All lubrication should be done before the saw is set in motion. Children should not be allowed to come near. Trying to work fast causes a large proportion of the accidents, and forcing timber may break the saw.

—*J. N. WHYTE, Farm Machinery Instructor,*
Department of Agriculture, Dunedin

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BOOK REVIEW

"The Daffodil and Tulip Year Book 1950"

"THE Daffodil and Tulip Year Book 1950" of the Royal Horticultural Society will give great service to the enthusiast and the commercial gardener in New Zealand. It features articles on virus stripe disease in narcissus, susceptibility of various varieties to pests and diseases, points of a good daffodil, the best 25 daffodils for exhibition, and how to stage daffodils for exhibition.

In the tulip section there are three articles of interest—newer varieties of tulips, tulips for forcing, and garden decoration and tulip species.

Most of the daffodil shows in Britain and the main shows of New Zealand and Australia are reported, and results of the competitions of the Royal Horticultural Society and descriptions of narcissus varieties which received awards are given.

—*R.O.*

Royal Horticultural Society, Vincent Square, Westminster, London SW1. 8s. 6d. Available from larger booksellers in New Zealand at 10s. 6d.

◆

Poor Practices which Household Poultry Keepers Should Rectify

MANY poor practices of household poultry keepers are continued more because of ignorance or a mistaken, even if sincere, belief than because of intentional neglect. Some of these practices inconvenience the birds, some cause discomfort, but others verge on cruelty. The housewife is often in charge of the fowls, and few women would be wilfully cruel, so such working methods must be carried out in ignorance. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, points out that a duty falls on the shoulders of the person mainly responsible for the care of the birds to learn from text-books, articles, or bulletins sufficient to understand at least the fundamentals of poultry husbandry.

POULTRY keeping does not consist merely of sheltering and feeding fowls and collecting the eggs. Many people have already found that out to their cost and have learnt the hard way that their ideas had to be amended. Unfortunately, hens are long-suffering if their minimum needs are satisfied, and they will produce eggs in remarkable numbers under conditions which are far from ideal. If more householders kept records of egg yields and management costs, not only would they realise the cost of producing a dozen eggs, but also they would be more likely to compare notes with neighbours, which would make them understand how uneconomic some units are and what good results can be achieved. Discussion and competition would bring about reforms more quickly.

However, the responsibility for acquiring the necessary technical knowledge falls on the household poultry keeper himself or herself. Other people's methods are their own concern, though their ways may affect others because through ignorance their ideas could be copied in the belief that they are proper. Novices in poultry keeping tend to seek advice from somebody with a few hens and to regard even a comparative tyro as an authority. A better method is to buy a simple but suitable text-book on poultry. Bulletins published by the Department of Agriculture include Bulletin No. 336, "Household Poultry Keeping", which is obtainable free from the nearest office of the Department.

The beginner should not be deterred by an impression that the whole subject is too technical or difficult. What is required is not a wide fund of knowledge, but a broad understanding of general principles.

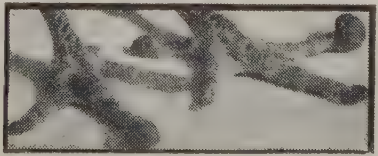
[*Fraser Niederer photo.*

A cockerel should never be run with laying birds except for breeding.

Feeding methods are easily learnt, because the general principles of feeding carbohydrates and proteins, minerals and vitamins, fats and vegetables, apply to all livestock and to human beings. The importance of greenfeed to poultry might not be appreciated by everybody, but failure to feed adequate greens is not nearly as common among backyarders as it is among commercial and sideline poultry keepers. The vitamin deficiency caused by neglect to feed fresh, luscious greens (or fish oils as substitutes) affects the health of the fowls, reduces egg yield considerably, and lowers the food value of the eggs that are laid. The fowls might appear to be adequately fed, but a deficiency disease is virtually starvation of essential foods.

Housing methods, sanitation, and equipment are largely subjects to be decided by common sense. Different aspects of these subjects have been covered recently in this series of articles. Infestations of lice, red mites, internal worms, and scaly leg mite, which also have been dealt with in the past few months, inflict unnecessary cruelty on the fowls if permitted to continue.

Other practices which are permitted to continue in too many poultry runs cannot be classed as cruelty, but at least they inconvenience the birds. Some fowls are regarded as household pets, but others are given little respect; at all times they should be treated with kindness.



[*Fraser Niederer photo*

A light case of toe balls in a young Australorp pullet. This condition is caused by birds coming into dusty pens from wet runs, by leaking roofs, and by water troughs overflowing.

Cockerels with Laying Birds

Unless the householder keeps a breeding pen, a cockerel should never be run with the laying birds. Running a male bird with layers has no advantages.

The worst feature is that the eggs are fertilised. That may not matter in cold weather, especially with light breeds, but during summer the warmth may start germination of fertile eggs; this is very likely to occur with heavy breeds that are prone to broodiness. When a germinated egg is taken into the house, cold conditions overnight will kill the life germ and a rotten egg will be the result.

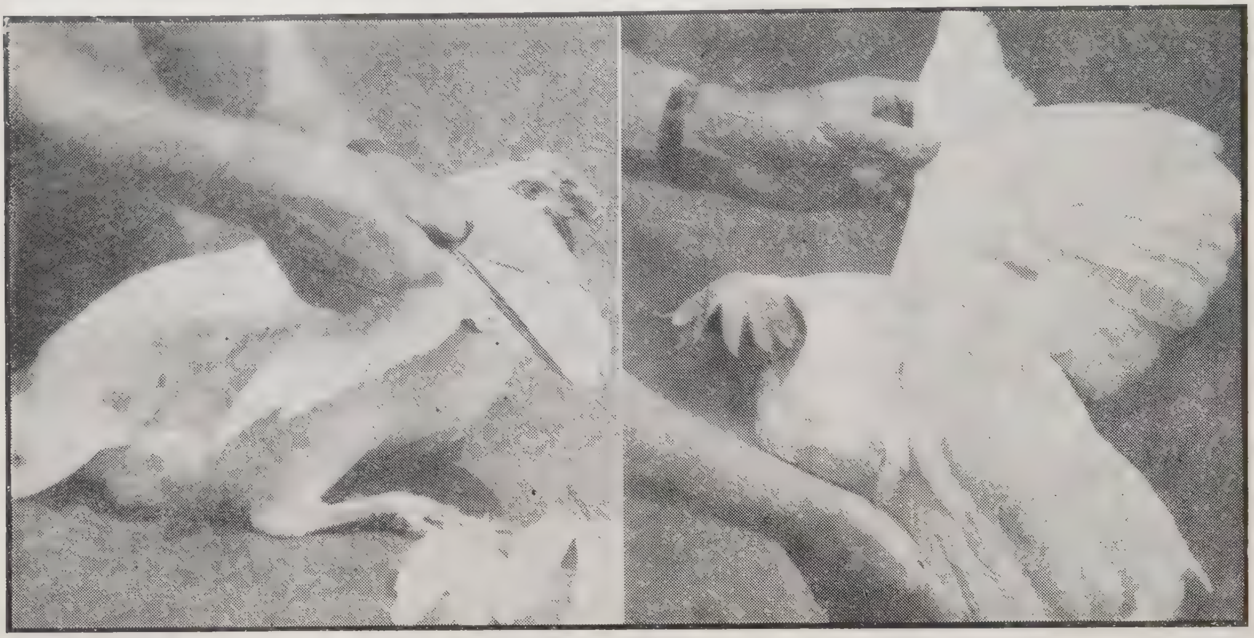
Eggs keep better when infertile, and for that reason alone no male bird should be run with hens or pullets except for breeding.

Toe Balls

Toe balls are caused by the birds getting wet feet and then scratching in dry dust. Layer after layer of dust accumulates and sets almost as hard as concrete. Finally, the birds have a ball like a drumstick head on each toe and they make nearly as much noise as a drum when walking on perches or other timber.

The balls adhere so firmly to the toes that attempting to pull them off is dangerous, because almost invariably the toe nails are pulled off at the same time. They are best removed by resting the foot on a solid surface of wood, concrete, or brick and tapping each ball lightly and repeatedly with a hammer until it breaks apart.

Better than curing this condition is preventing it by removing the source of the trouble, which is invariably moisture. Puddles in the run, a leak in the roof, and overflow from the water trough are likely causes.



[*Fraser Niederer photos.*

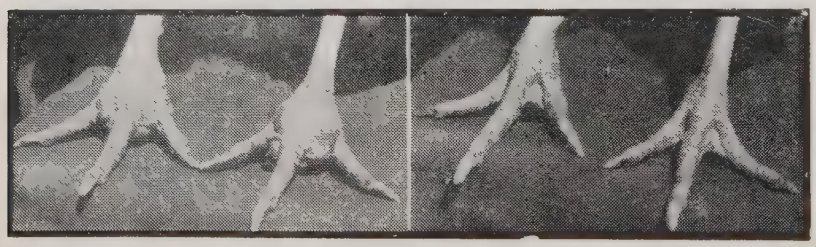
Left—The correct way to trim a wing is to remove only the flight feathers, leaving the secondaries to keep the kidneys warm. Right—The wing as it should appear when clipping has been completed.

Bumble Foot

A condition often confused with corns, bumble foot is more likely to affect heavy fowls than lighter ones or pullets. The ball of the foot and surrounding structures become swollen, finally bringing about lameness. The swelling may be caused by articular gout or even a hereditary weakness, but is more likely to be caused by foot injuries or prickles. Jumping off high perches and projections on to hard-packed flooring is often blamed, but constant walking on concrete or other hard surfaces, particularly when the chick is young, is a major factor in bringing on the trouble in later life.

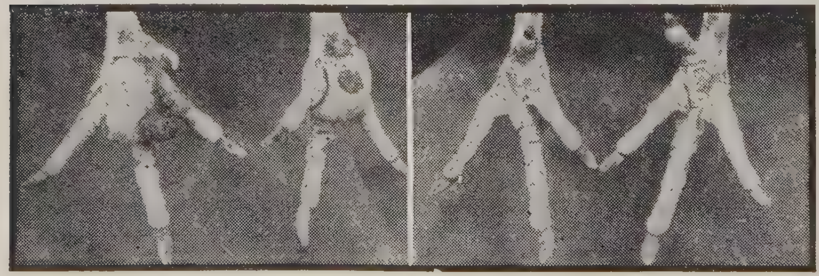
Bumble foot involves death of some of the deeper foot structures and is often associated with infection. The dead material becomes "cheesy" and inflammation extends over the whole foot. The only cure is surgical treatment by opening the foot at the lowest point, making the incision in the direction of the toes, and scraping away the dead material, followed by suitable wound treatment. This is justifiable with valued birds, but the trouble is likely to recur. For a case of gouty swelling (not true bumble foot) such treatment is useless.

Bumble foot can be prevented by supplying a deep, soft litter, lowering perches, if necessary, removing projections, taking away large stones in the run, and fencing off prickly hedges.



[*Fraser Niederer photos.*

Above—Front views of the shanks and feet of a White Leghorn hen infected with bumble foot and of an unaffected bird. Below—Rear views of the same two pairs of feet. This condition should not be confused with corns, which are not really troublesome. The swelling of bumble foot comes up between the toes, causing discomfort in mild cases and severe pain and lameness in bad cases.



Cutting of Wings

Young pullets can fly over a 6ft. fence, and Leghorns think nothing of 9ft. With age the birds put on more body weight and cannot fly so high.

Cutting the wing feathers is common, not so much to prevent flying altogether as to disturb the direction of flight. Two frequent mistakes are cutting both wings, which restores the evenness of flight, and taking off all the large wing feathers, which leaves the bird with insufficient covering for the kidney area. If the wing is fanned out, one of the large feathers half-way along will be seen to be much shorter than the rest. Only the flight feathers from the short "axial" feather to the outer end of one wing should be cut.

Much of the trouble caused by birds flying over fences can be obviated by regular and adequate feeding and by giving young pullets greenfeed at midday as well as after the grain feed at the end of the afternoon.

New Methods of Drilling Pastures

By L. W. BLACKMORE, Instructor in Agriculture, Department of Agriculture, Timaru

A GOOD deal of controversy has always centred round the relative merits of drilling and broadcasting permanent pasture mixtures. This article reviews the methods at present used and discusses the possibilities of new methods of drilling in which greatly improved cover is being obtained.

[National Publicity Studios photo.

THERE are two important requisites for first-class pasture establishment: Quickness and certainty of strike and cover. Drilling favours the first and broadcasting the second. As cover is a most desirable feature of permanent pastures, broadcasting is general wherever moisture and fertility conditions give reasonable assurance of a good strike and establishment. The importance of good cover cannot be overstressed. It allows a more complete utilisation of the soil by the plant, assists easy penetration of rain and dews to the roots, and generally tends to attract moisture. It reduces to a minimum evaporation of light showers from the surface during the warmer months, encourages clovers to spread among the grasses, and reduces the extremes of temperature near the surface of the soil in both summer and winter. It also results in greater pasture production.

Under the low-rainfall conditions of the arable districts of the South Island the fallow is the best insurance for good establishment where seed is broadcast, and adequate consolidation before sowing is undoubtedly the most important factor in ensuring a good strike. Excellent strikes are obtained by the use of a broadcast box attached to the back of a roller. The main disadvantage is that the manure is not placed in direct contact with the seed.

However, on light land consolidation and fallowing in themselves are not enough to ensure successful establishment. The seed must be placed in the moisture by drilling to ensure a good strike; the placement of the manure in the region of the developing seedlings also favours quick establishment. Rightly, therefore, on light land, cover is sacrificed for an assured strike. As cover is not as important for temporary pastures, the advantages of drilling are usually exploited when sowing Italian or short-rotation ryegrass, though short-rotation ryegrass on the better classes of soils is also broadcast where it is intended to keep the pasture down for several years.

Serious Defects

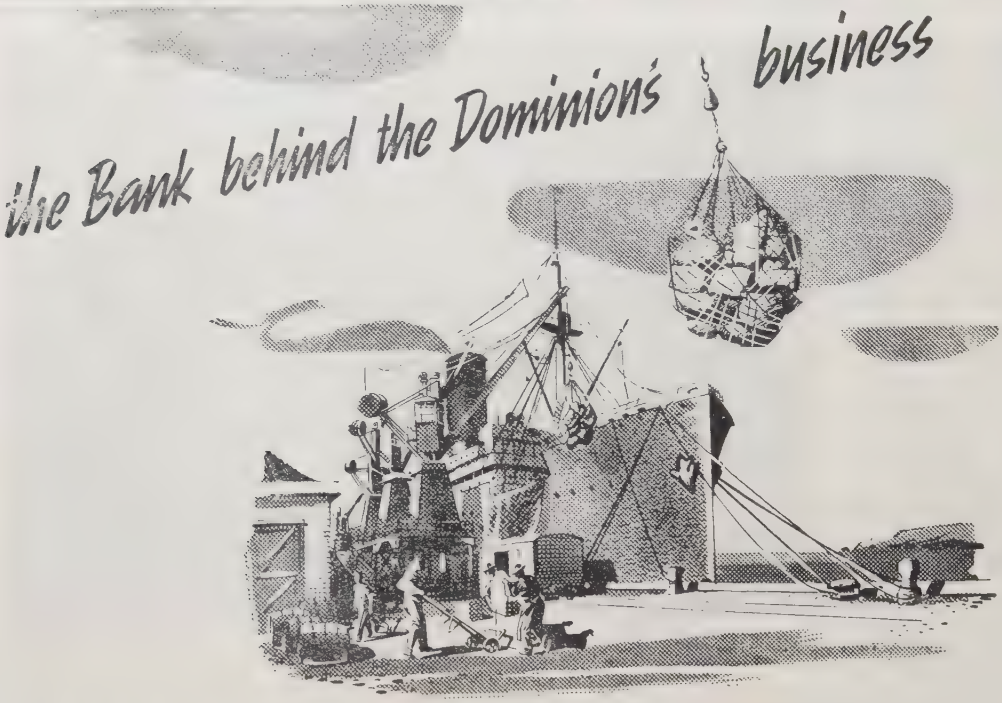
Despite its obvious advantages, the drilling in of pastures has two serious defects: The first is that it gives a poor cover and the second that there is over-congestion in the row. Drilling invariably favours the grasses to the detriment of the clovers. The grasses come away quickly and the competition they give the clovers often results in poor establishment of the latter. Although the grasses thrive in the early stages, the rows are likely to suffer from congestion later.

In attempts to improve the cover of drilled-in pastures modifications of straight drilling are sometimes resorted to. The tubes may be removed and some of the seed and manure allowed to fall between the coulters or some of the mixture may be sown through the grass-seed box. These methods usually give poor results, because the surface consolidation between the drills is broken by the passage of the coulters. Consolidation may be regained by rolling after drilling, but this is often risky, especially where the soil tends to run together after rain.

Ideal Method

The ideal method of sowing pasture would appear to be some way of drilling which would give a better cover than that obtained by ordinary 7in. drilling. The need has long been realised and in attempts to meet it special drills have been constructed with more closely spaced coulters. There are at present in New Zealand several disc drills with coulter spacings of 4in. They have, however, the disadvantages of not sowing the manure with the seed and of not being suitable for

Trial plots drilled at Arowhenua with dual-purpose type of attachment. Left—3½in. rows. Right—Sub-surface broadcasting.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stony soil. Another drill which was built in New Zealand some years ago with coulters spaced every 3½in. was tried, but owing to several practical difficulties the design was abandoned.

Broadcast Coulter

Following this, Holland invented a broadcast coulter which is fitted to the drill by removing the standard coulters and drag-bars. This coulter has been tried out in South Canterbury for the sowing of grass, wheat, barley, linseed, linen flax, and greenfeed. With cereals no significant improvement in yields or quality of grain has resulted. Good results have, however, been obtained with the linen flax crop, for which an even distribution of the plants is of great importance. Substantial increases in crop weight together with improved length and quality of fibre have also been obtained, and the improved distribution of plants tended to suppress weed growth. In a greenfeed trial with Algerian oats a 25 per cent. increase in the yield of leafage resulted at the time of the first feeding off.

Three New Types of Coulter

Attention is now being focused on the production of three types of coulters or coulter attachments. In the first type subsidiary coulters are attached to standard coulters and are offset to give 3½in. spacings, in the second type a coulter attachment is made to fit over the point and lower portion of the coulter, and in the third type a shoe capable of sowing 3½in. rows or of sub-surface broadcasting, or both, replaces the standard point. In the first type the stream of seed and manure is divided immediately under the drill boxes and is led by separate tubes to the standard and subsidiary coulters; in the second and third types the stream is divided immediately below the coulter to give two rows per coulter spaced 3½in. apart or is distributed to give a sub-surface broadcast. In the dual-purpose type of attachment, which will sow 3½in. rows or give a sub-surface broadcast, the change-over from one to the other is made by a simple adjustment.

Pasture drilled in 7in. rows.

Whatever the design of these special attachments, their future value will depend largely on the extent to which they comply with the following. They should:—

1. Distribute the seed and manure evenly along the rows and at an even depth and should not be prone to blocking.
2. Allow good clearance.
3. Cause a minimum of soil displacement, so that there is no difficulty in covering with harrows.
4. Be easily attached and removed and should be attachable with a minimum of structural alterations to a drill.

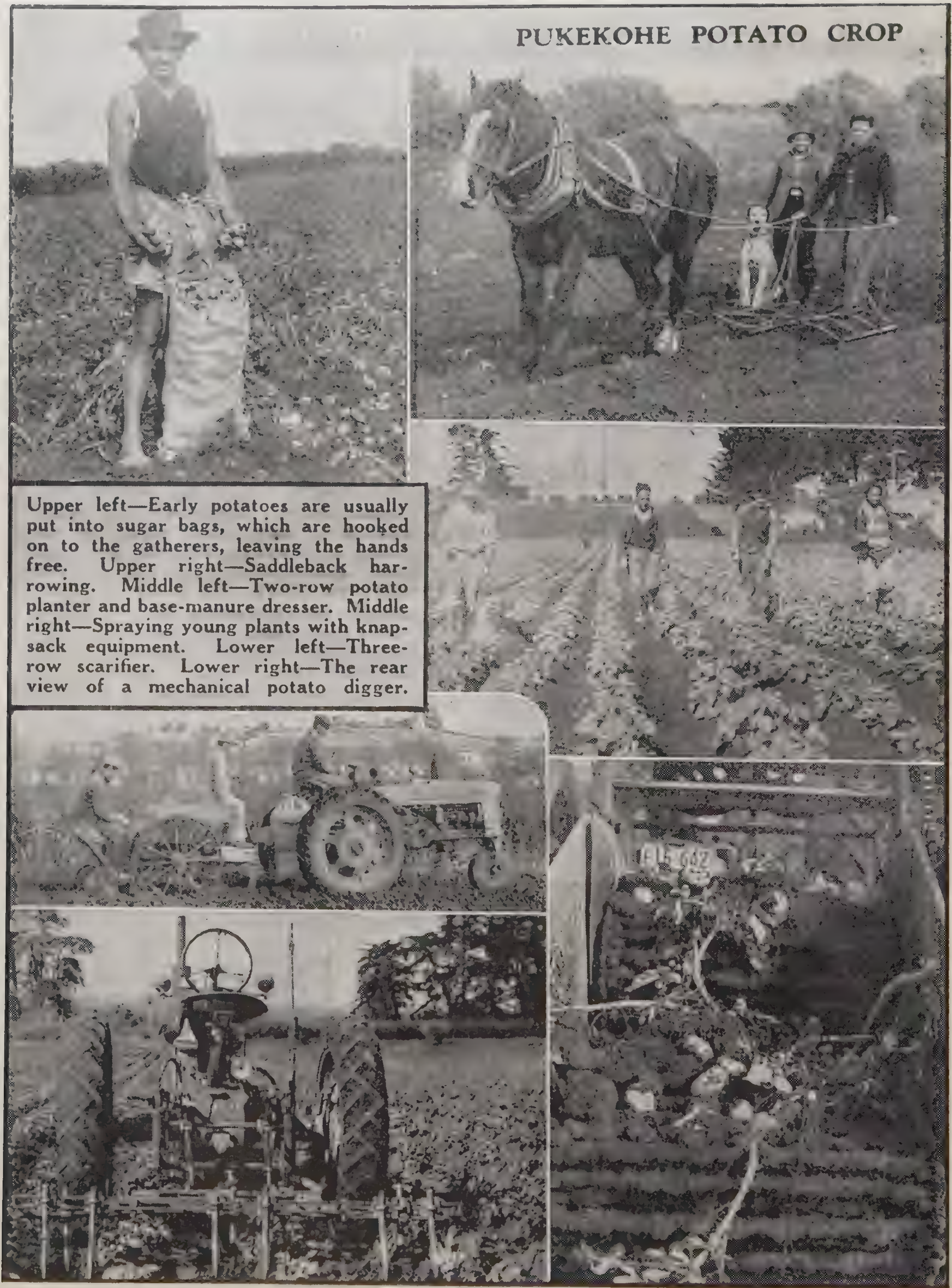
. Be cheap.

There is little doubt that improved methods of drilling will be valuable chiefly in the sowing of pastures. In North Canterbury the subsidiary type of coulter and in South Canterbury the dual-purpose (3½in. and sub-surface broadcast) type of coulter fitting were tried last autumn for sowing pastures and proved satisfactory. Both will sow seed and manure well in 3½in. rows. The latter type has also given an underground broadcast of 6in. per coulter, which resulted in virtually a complete cover shortly after the pasture was established. Apart from the sowing of grass, however, these methods of drilling appear to offer advantages in the sowing of other crops, particularly linen flax, lucerne, and peas. The probable value of 3½in. drilling and underground broadcasting as an aid to the control of weeds cannot be overlooked.

The use of the attachments described has already demonstrated that clovers are given a much better chance of establishing than when pasture mixtures are sown in 7in. rows, because of the reduced competition from the grass. However, a note of warning must be sounded with regard to rates of sowing. Because of the more certain strike obtained by drilling, it is probable that a reduction in the amount of seed sown per acre should be made. Trials with varying rates of seeding are being planned.

Linen flax trial plots. Left—Sown with Holland coulters. Right—Sown with ordinary coulters.

PUKEKOHE POTATO CROP



Upper left—Early potatoes are usually put into sugar bags, which are hooked on to the gatherers, leaving the hands free. Upper right—Saddleback harrowing. Middle left—Two-row potato planter and base-manure dresser. Middle right—Spraying young plants with knapsack equipment. Lower left—Three-row scarifier. Lower right—The rear view of a mechanical potato digger.

[*My Bonnie Candid Studios photos.*

Early Potato Culture in the Pukekohe District

PUKEKOHE HILL is known throughout New Zealand for its early potatoes. To grow those potatoes it has been necessary to modify cultural practice to meet the peculiar climatic and soil conditions of the locality and to take full advantage of the most suitable areas in the district. In this article T. C. R. Dawe, Vegetable Instructor, Department of Agriculture, Pukekohe, describes the culture of early potatoes in that district.

POTATO growing has been carried on in the Pukekohe district since the late 1880's, at which time production was only for local consumption. There was little subsequent expansion until the opening of the North Island main trunk railway in 1911 brought southern markets within reach of local growers. The demand from southern markets for early Pukekohe supplies soon stimulated greater production and "The Hill" became the principal source of early crops.

Pukekohe Hill, in its earlier state, was covered with heavy puriri bush. As the bush was cleared greater areas were brought under cultivation and planted in potatoes. The present area in potatoes extends from the hill to surrounding districts and approximates 600 to 700 acres annually. In addition to this area of potatoes, which are grown for table use, from 200 to 250 acres are grown each autumn for seed potatoes.

By chance it was discovered that early potatoes could be grown with greater success from locally grown tubers than from seed potatoes from outside districts and it is now the accepted practice to select tubers from the early table crop for planting in early summer to produce an autumn crop of seed potatoes. This crop barely matures before being dug and sown for table potato production the following spring. Many growers have been using the same strain of potato for the past 10 to 20 years without any apparent deterioration in quality. Seed potatoes from outside districts rarely yield satisfactorily the first season, but good results may be obtained after the second or third season.

Practically Frost Free

Pukekohe Hill is practically frost free and potatoes may be grown the year round except on the lower slopes. Planting for the table crop begins in May and harvesting of early potatoes begins in late August. Crops for August and September harvesting are grown on the higher portions of the northern and north-eastern slopes or other more or less frost-free areas on the hill, while succeeding crops are grown on the lower slopes and surrounding areas. The harvesting of table potatoes extends from August to January.

Tubers for the seed crop are usually planted in November and December and harvested the following April and May.

Although the volcanic soil of Pukekohe Hill and the surrounding clay loams break down to an excellent tilth under satisfactory moisture conditions, they become exceedingly sticky and puggy during winter and early spring and cultivation of the soil is very difficult at those periods. Harvesting during a wet spring can be very unpleasant, the sticky wet soil clinging firmly to the tubers as well as to implements and the boots of the harvesters.

Despite the drawbacks to the working of such puggy soils, they are favoured for potato production, as they have proved fertile and very suitable for early crops.

Soil Preparation

It is the usual practice to give deep initial cultivation first by ploughing to a depth of at least 8in., followed by deep discing.

Because the puggy soils rapidly clog the mouldboard type of ploughs, ploughing is carried out almost entirely with disc ploughs.

HEADING PHOTOGRAPH: Early potatoes bagged and ready for transport to markets. My Bonnie Candid Studios photo.

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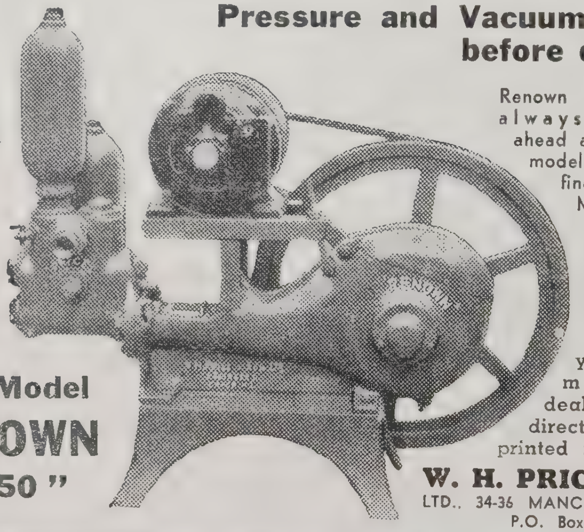

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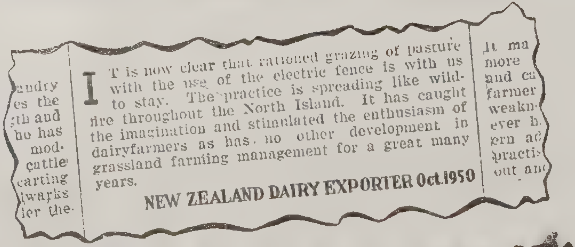

It is now clear that rationed grazing of pasture with the use of the electric fence is with us to stay. The practice is spreading like wildfire throughout the North Island. It has caught the imagination and stimulated the enthusiasm of dairyfarmers as has no other development in grassland farming management for a great many years.

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As most potato crops are grown in market gardens and follow other vegetable crops, initial cultivation need not be extensive; ploughing followed by two or three strokes with tandem discs is usually sufficient, providing soil conditions are suitable. Frequently, however, heavy rains are experienced at the time the land is being prepared for planting and a second ploughing and discing becomes necessary.

Where land for a potato crop is broken out of pasture it is customary to begin operations in March or April by rotary hoeing the area twice. The first cut is shallow, being just sufficient to cut the turf, and the second is made across the first cut and slightly deeper than it. The mulch of turf is left to break down for 3 weeks and is then given a double cut with tandem discs and a cross-harrowing. Almost immediately the area is disc ploughed to a depth of 8 to 10in., harrowed, and left fallow for about a month. A second ploughing and discing is given just before planting.

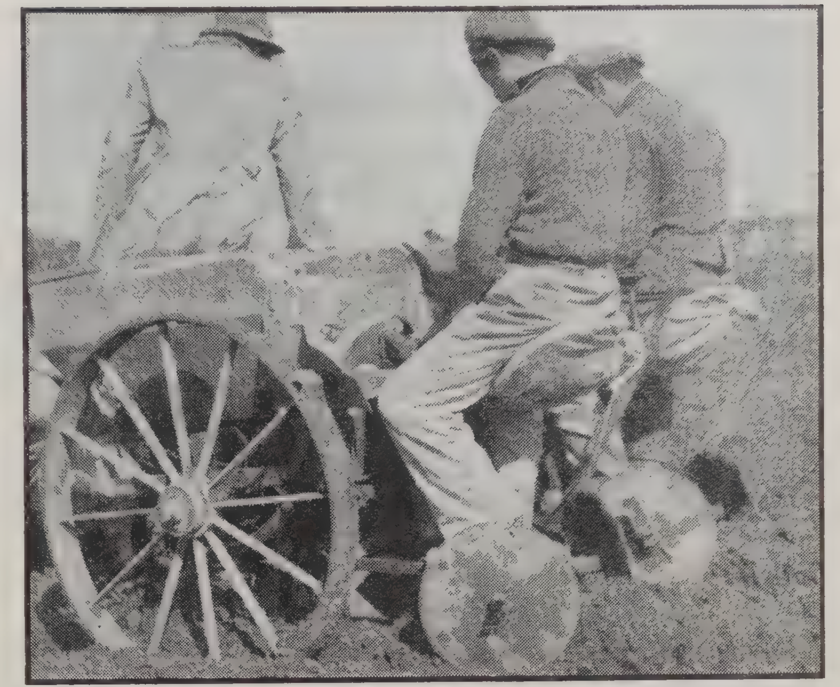
Fertilisers

Fertiliser applications are heavy, growers having learnt from experience that unless ample quantities are used, yields tend to be disappointing. Applications ranging from 20 to 25cwt. per acre are common, and though this may seem excessive, it must be remembered that the land is under continuous vegetable cropping.

Most growers have their own particular fertiliser mixture, though generally they differ little. Good yields of early table potatoes have been secured when using the following mixture at from 20 to 25cwt. per acre:—

	Cwt.
Sulphate of ammonia	2
Dried blood	3
Blood and bone	3
Bonedust	7
Superphosphate	4
Sulphate or muriate of potash	3

A side dressing of 1cwt. of superphosphate plus ½cwt. of nitrate of soda is applied by many growers before the final moulding.



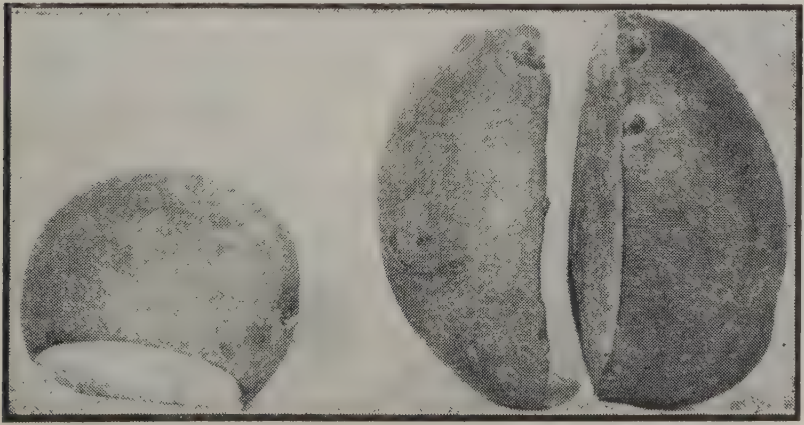
[*My Bonnie Candid Studios photo.*

Two-row potato planter, showing discs at rear which ridge up rows as they are planted.

The crops planted in November and December for seed purposes are often planted on land from which early crops of potatoes have been dug not long before. The usual fertiliser application for seed potato crops is 7cwt. of blood and bone and 7cwt. of superphosphate per acre.

Three Potato Crops in 14 Months

Although rotation of crops is recognised as being advisable, three crops of potatoes have been harvested from the same piece of land within 14 months (first crop planted in July and harvested in October; second crop, November to March; and third crop, May to August). This gives some idea of the intensive cropping carried out on Pukekohe Hill.



[*My Bonnie Candid Studios photo.*

Seed potatoes of the Arran Chief variety. Left—Chipped seed. Right—Cut seed.

Varieties

Arran Chief is the most popular variety for the early crop and Northern Star (Gamekeeper) for the second-early crop. Both varieties have proved very satisfactory in this district, yielding good-sized, shallow-eyed tubers.

Planting is usually carried out with mechanical planters on which seed box and manure hopper are mounted, planting and base manuring of the crop being completed in the one operation. The planters place the manure at the bottom or on each side of the shallow drills and ridge the rows to an approximate height of 6in.

On very small areas manuring and planting are done by hand.

General Cultivation

Should heavy rain occur before emergence of the plants, a deep, narrow scarifying is given between the rows to assist drainage. The scarifier consists of one tine set deeply for each row.

As soon as the plants appear above ground saddleback harrows are used for weed control and to loosen the soil. Several strokes of the harrows may be given, depending on the extent of growth. Good control of weed growth is usually secured with the harrows and little hand hoeing is needed at this stage.

When the plants have become well established and too large for the saddleback harrows to be used, hand

[*My Bonnie Candid Studios photo.*

A highly mechanised spraying outfit. In this photograph the outfit is being used on tomatoes, but it is adaptable for potatoes, when it can cover 12 rows in one stroke and spray 25 acres per day.

hoeing, scarifying, and light mouldings are given.

Methods of scarifying and moulding potatoes differ among growers, but the usual practice is to use equipment which will cultivate two or three rows at a time and which is attached to the tool bars of tractors. In some instances three separate scarifiers or moulders are drawn by a tractor, each being attended by one man.

Disease and Pest Control

Because of moist conditions and the humidity in the Pukekohe district, late blight (*Phytophthora infestans*) is very prevalent and preventive measures are necessary from the time the plants emerge to within a fortnight of harvesting.

In earlier years Burgundy mixture 4 : 5 : 50 was the most favoured fungicide with Bordeaux mixture 4 : 5 : 50 used to a less extent. Of recent years copper oxychloride at 5lb. to 100 gallons of water has become very popular among growers for the control of late blight. Though it controls late blight as satisfactorily as either Burgundy or Bordeaux, it appears that copper oxychloride has the advantage of a less harsh effect on the foliage of potatoes.

In most seasons up to 10 sprayings are found necessary; the intervals between applications and the number of sprayings are determined by weather conditions and the severity of infection. The quantity of spray used per application varies from 20 to 30 gallons per acre in the early stages of growth to 200 to 250 gallons when the plants are mature.

Potato tuber moth (*Gnorimoschema operculella*) is seldom troublesome in early crops, but from January to May it is necessary to protect tubers from injury by the larvae of the moth. Thorough, high mouldings will assist to protect crops in the field. It is usual to remove tubers from the field immediately they are dug and haulms are not used to cover bagged potatoes because of their attraction for moths.

D.D.T. at the rate of ½lb. of powder (50 per cent. actual D.D.T.) to 50 gallons of spray is applied for the protection of growing crops and D.D.T. dust is often applied to tubers in storage, containers being dusted as well.

Potato scab and powdery scab are not troublesome in the district.

Harvesting

Harvesting of early potatoes begins before the tubers are mature, and because they are more easily damaged at this stage hand digging is usually done; later crops, which are harvested at a more mature stage, are generally lifted by mechanical diggers.

Yields vary according to the months of harvesting, average crops being: September 4 tons, October 5 tons, November 7 tons, December and January 8 tons. Heavier yields, of course, are obtained in favourable seasons.

The potatoes are graded and bagged in sugar bags on the field immediately after digging and then dispatched to markets.

Seed Potato Production

Pukekohe growers prefer locally grown potatoes for seed. Seed certification of potatoes is not carried out in the district, but growers pay particular attention to the selection of tubers for seed purposes.

Seed potato crops are grown between November and May and tubers for planting these crops are carefully selected from table potatoes harvested some 4 weeks earlier. As the potato tuber moth is not very active at this time, the tubers are left in the field for 2 or 3 days after digging to harden off and then are stored in bags.

A common practice among growers is to cut the larger tubers into two or three sets, according to the size of the tuber, and to "chip" the smaller ones.

On occasions when early sprouting is desired treating the tubers with a carbide solution has been successful in breaking the dormancy and inducing sprouting. Eight ounces of carbide is added slowly to 11 gallons of water (over a period of 10 to 15 minutes) and 1cwt. of potatoes is soaked in the solution for 4 to 5 hours. It is customary to plant the tubers immediately after treatment, but at times they are held between moist sacks for 1 or 2 weeks and then "greened" and planted.

When the seed crop is harvested the tubers are again carefully sorted and any poor ones discarded. Storage until required for planting for the early table crop is done in well-ventilated sheds or sometimes in shallow sprouting boxes under tree shelter.

Early potatoes are a costly crop to produce, the amount being assessed at between £120 and £130 per acre at present.

Successful production depends upon careful attention to the following points:—

Selection of a good strain of locally grown seed potatoes.

Adequate manuring.

Good inter-row cultivation and moulding.

Satisfactory control of diseases.

Careful harvesting, grading, and packing.

◆

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BULLDOZING HILL-COUNTRY TRACKS

TO help keep New Zealand's hill country in production more and more attention is being paid to the application of lime and fertilisers to hill-country grassland, but because of their bulk lime and fertilisers are difficult to cart up steep hills over which they are to be distributed. For many years the only method was by packhorse, which was laborious and slow. With the introduction of the bulldozer came a cheap method of making tracks suitable for trucks and tractors, and advice about the making of such tracks is given in this article by K. M. Montgomery, Fields Instructor, Department of Agriculture, Te Kuiti.

This fence was pulled down and re-erected to one side after a track had been cut along the top of the ridge.

THOUGH tracking has simplified the distribution of farm supplies, in some areas it has brought in its wake soil erosion which, if not carefully countered, could ultimately cause damage that would outweigh the benefits derived from the tracking. Many tracks on hill country are steeper than public roads and much spectacular damage may occur. Even slight scours can develop into ravines, and careful attention needs to be paid to designing the tracks.

In addition to erosion originated by the scouring of track surfaces and spoil slopes, in numerous instances erosion has been started by the slumping of soil from the banks and slopes immediately above newly opened tracks traversing hillsides. This form of erosion frequently occurs in soft, crumbly, mudstone soil types in districts where rain is likely to fall in heavy concentrations, and in many instances it leads to blockage and destruction of tracks as well as to extended erosion of hillsides. This difficulty will always have to be faced in such country, but it might be alleviated by siting hillside tracks on slopes of sunny aspect wherever possible, especially in high-rainfall districts, and by battering the slopes of the top sides of the banks.

Among points to be considered when a system of tracks is being designed are grade, the diversion of water and the provision of water-tables, and the use of trees and grasses to protect the track.

Grade

Wherever possible a main track should be made on which large motor lorries can take the bulk supply of materials to a convenient point for further distribution by tractor-trailer, other farm conveyance, or 4-wheel-drive lorry. Under average conditions the grade of the main track should not be steeper than 1 in 10. If the track is being cut through stiff clays or rubbly soft rock, the grade could be increased a little—say, to 1 in 8; if the track is being put through soft soils or pumice, the grade will need to be lessened to 1 in 12. Grades above these limits cause considerable difficulty in hauling a full load on the ordinary rear-wheel-drive vehicle.

Subsidiary tracks should be kept to the tops of the ridges as much as possible where the ridges are level or not too steep, as this reduces the likelihood of damage by heavy rainfall. Scouring is likely to occur on tracks made up a steep ridge, and provision must be made to divert water from such tracks. To obtain a suitable site for these tracks it might be advantageous to pull down a fence, grade off the top of the ridge, and re-erect the fence to one side of the track.

Two views of tracked country, on which ridges were made use of wherever possible.

Trees planted at the edges of bulldozed tracks help to hold the spoil together. Planting them sloping outward discourages stock from reaching out for the foliage from the tracks.

The grade of these tracks will be determined by the vehicle or method of distribution from the main track terminal. It is possible to take a small 4-wheel-drive vehicle over tracks with a grade of 1 in 2, but such a grade has two main disadvantages: A big strain is imposed on the machinery, and water scouring is too likely to occur unless full provision is made against it. Grades of 1 in 4 and less steep are more desirable.

Diversion of Water

Very close consideration must be given to the method by which rainwater will be collected and carried off the tracks.

As the tracks are customarily used only during dry weather, on easy inclines they can be graded so that there is a gentle fall from the inner or bank side to the outer or spoil side. Rainwater then does not accumulate and form a channel, but for the best result from this type of water run-off the track and spoil must be well grassed, or runnels will form on the track and eventually cause scouring.

If the track is steep and a grass sward will be difficult to obtain, the grading should be from the outer to the inner bank and provision should be made to collect the water and pass it through culverts. The number of culverts needed depends on the area of land above the track which will act as a water-catching area and on the steepness of the track, and one every 2 chains or so might be required. Springs exposed by track excavations should be tapped and the water led away through culverts. The delivery end of a culvert should protrude far enough to prevent water falling on to the spoil and washing it away. Two pieces of timber suffice for shear-legs to carry the end of the culvert.

Only 9 months after the track had been cut, erosion had caused this damage because drainage culverts had not been provided.

Trees and Grass

Part of many tracks is on solid land and part on filling or spoil, and some provision should be made to prevent the spoil from falling away. The planting of poplars, willows, or other trees assists very materially in holding the spoil together. Poplars or willows are better planted at an outward angle and not upright, for then stock are not encouraged to reach out from the track for the leafage, nor can they reach it from below. When the trees have become properly anchored, small logs can be laid against the trunks to assist further in arresting downward soil movement. Trees can be planted on both sides of the track where it passes along the top of a narrow ridge, but they should not be planted where the roots will fill and block drains or culverts. Joins in drain pipes or culverts are better cemented so that trees can be planted without concern about roots entering at joins and hampering drainage.

Space planting of trees above the tracks as well as in the spoil below would ultimately lessen bank erosion, though slumping may occur before trees become strongly established. The speediest and most effective agent in retaining the track is undoubtedly a turfy sward, which should be established as soon as possible after the track has been made. Such species as danthonia, browntop, and paspalum could well be included in the mixture for the sides, and perennial ryegrass should always be included for the tracks.

Novel Hive Clamp

By S. LINE, Apiary Instructor, Department of Agriculture, Invercargill

SHIFTING of beehives from one apiary to another site, perhaps miles away, is rather exacting work, often involving the use of strips or battens, nails and staples, and an assortment of bits and pieces. The work needs to be done with sufficient care so that bees will not escape when subjected to the vibrations of rough roads.

HAMMERING in the battening down of hives for transport will excite the bees and cause them to seek any opening or fault in the woodwork through which they can escape. Therefore whatever way is used in preparing hives for shifting, a quick method of operation and a minimum of hammering will cause less disturbance to bees and make the work less arduous.

Mr. C. Kellett of the Gore district has developed a type of clamp which causes no more annoyance to the bees than the removal of the lid and placing over the hive of the usual wire ventilation screen. The remainder of the procedure involves the tightening of nuts on clamp irons (one on each side of the hive) and the use of a wooden batten across the top (Fig. 1).

The clamping of the hives can be done without exciting the bees and the entrance screen can be fitted in place after everything else is completed.

Sufficient thread is run on the ½in. rods to provide for any variation in assembling the hive for transport, as some beekeepers retain the bottom board under the hive and others stand the hive in the lid; hives being shifted a short distance may not need top screens and the lid may be retained.

The method of bracing improves the lifting and carrying of hives, especially when working single-handed (Fig. 2).

For transport in double-deck fashion (Fig. 3) the upper hive would be resting on two bearers (3in. x 2in.) that run the length of all the hives in the lower storey, giving clearance to the batten and the small part of the rod that passes under the bottom board.

Cost of Materials

Preferably, rods should be ½in. thick, but ⅜in. rods can be used, when a saving of about 5s. would be made per dozen sets. When produced in quantity the 24 ½in. rods necessary for 12 hives can be made for 15s.; the battens (20in. long) cost 4s. and ordinary standard square nuts 2s.

If wing nuts are used, they would cost 6d. each. One clamp set costs 1s. 9d. (two ½in. rods 2ft. 3in. long, 1s. 3d.; 3in. x 1in. timber, 4d.; nuts, 2d.).

The advantages of the clamp are the simplicity of its parts, the hives can be quickly clamped together without disturbing the bees, the rods form an easy hand grip for carrying hives single-handed, and the hives stay bee tight over the worst roads.

The disadvantages are that the average beekeeper would have to get the rods made at an engineering shop with a thread at one end and a sharp bend at the other end and that he might lose nuts or washers.

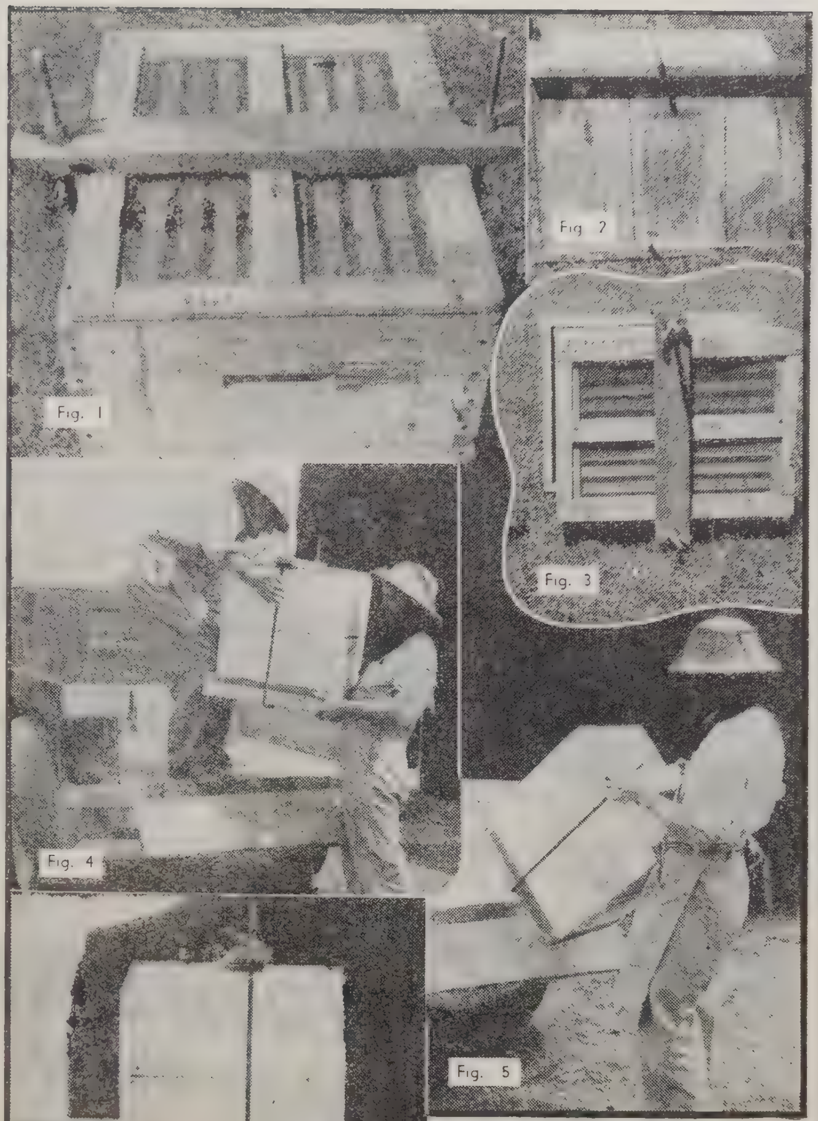
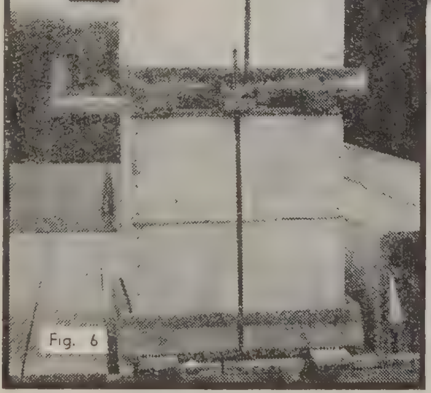
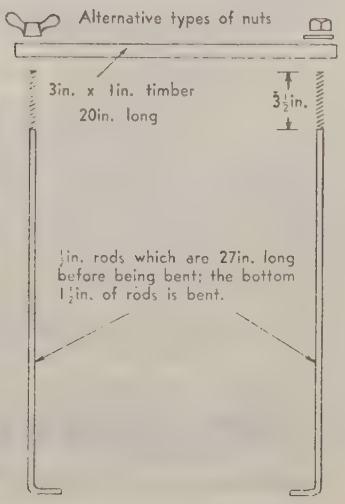



Fig. 1—Top of clamp, showing batten and wing nuts. Fig. 2—Clamp at bottom of hive. Fig. 3—Clamp at top of hive. Fig. 4—Clamp holding lid on bottom of hive and a screen on top. Fig. 5—A hive can be lifted easily by one man. Fig. 6—Method of clamping and stacking hives for double-deck transport.

DETAILS OF HIVE CLAMP


Alternative types of nuts
3in. x 1in. timber 20in. long
3½in.
½in. rods which are 27in. long before being bent; the bottom 1½in. of rods is bent.

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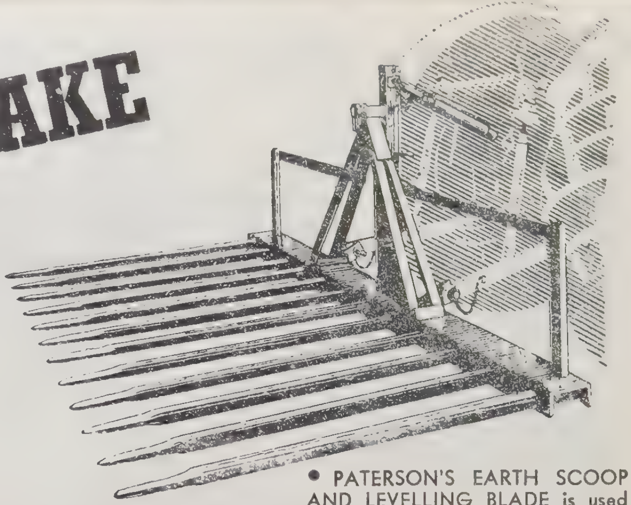

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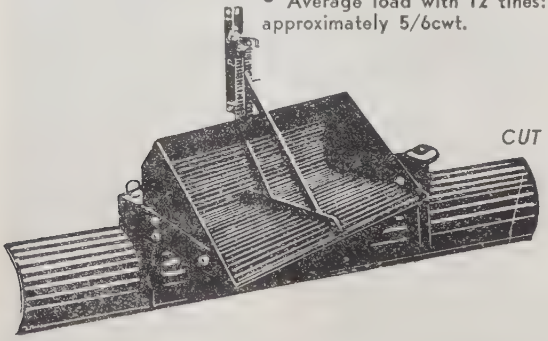

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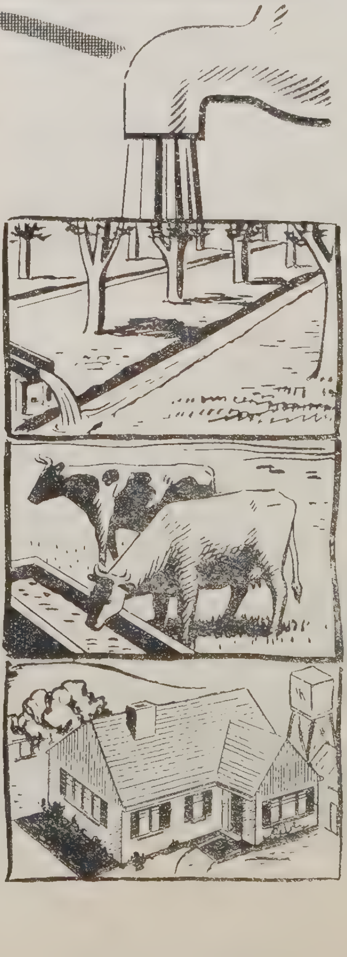

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POISONOUS PLANTS IN NEW ZEALAND

THIS is the eighth section of a series of descriptions of poisonous plants which grow in New Zealand by H. E. Connor, Botanist, Department of Scientific and Industrial Research, Wellington. The series is appearing monthly in the "Journal", and glossaries to be used with the series were published with the first section, which appeared in the October, 1950, issue.

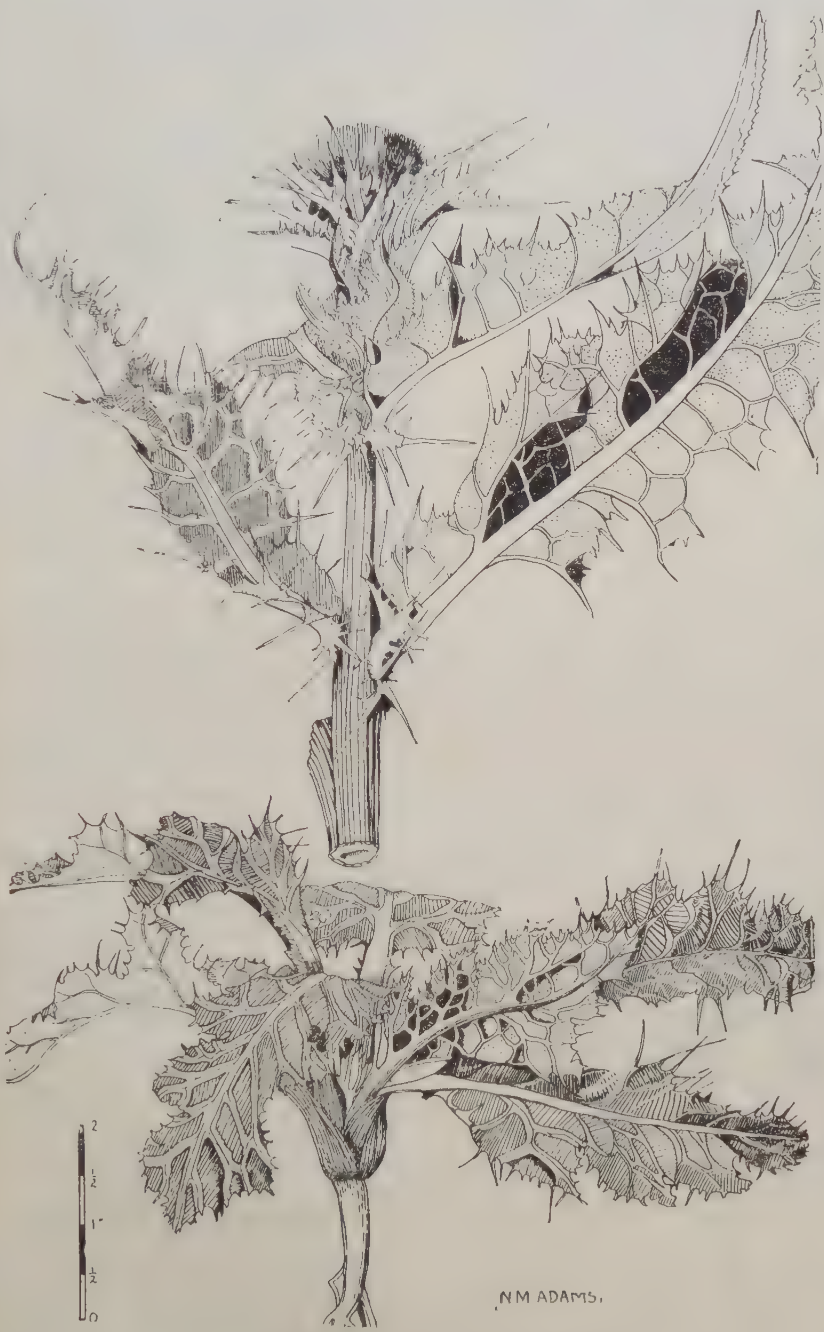

Fig. 17—Variegated thistle (*Silybum marianum*).

DICOTYLEDONS

Compositae

Variegated Thistle. Milk Thistle. *Silybum marianum* **L. (Gaertn.). (Fig. 17)**

Botanical description: Habit—Annual to short-lived perennial herb, up to 3ft. or more tall. Stems erect or ascending. **Leaves**—Shining, white flecked and blotched, oblong-elliptic, lobed, with broad, thorn-tipped segments; upper leaves heart shaped; spines strong and yellow. **Flowers**—Purple florets in heads up to 2in. long. (Eurasia and North Africa.)

Habitat: Waste places and pastures.

Distribution: Common to locally abundant in North Island, less common in South Island.

General: In the autumn, winter, and early spring of 1946 a substantial number of cattle were lost in Hawkes Bay. The cattle had been turned out on to areas in which there were variegated thistle and winged thistle (*Carduus tenuiflorus* Curt.) in large quantities and little other fodder. Poisonings by variegated thistle are also recorded in Australia. Cattle are most frequently poisoned, but sheep are not entirely immune, as Australian records show. Both young and mature cattle can be poisoned by variegated thistle and, as with most poison plants, it is hungry or travelling stock which are usually affected. Cows in calf are likely to abort. The plant does not become innocuous when dry, nor does one part of the plant appear more toxic than any other. The type of poisoning which occurs with variegated thistle is that also caused by mangolds.

Symptoms of poisoning: Ante-mortem symptoms are drowsiness, staggering movements, muscular tremors, diarrhoea, and rapid pulse; tympanites may occur. Post-mortem examination shows gastro-enteritis, congestion of liver and kidneys, and chocolate-brown blood resulting from the change of haemoglobin to methaemoglobin.

Poisonous principle: Considerable amounts of nitrate occur in the plant; the nitrates are reduced to nitrites in the rumen by bacterial or enzyme activity, and the nitrites produce the symptoms of poisoning.

Solanaceae

Cestrum. *Cestrum* **spp. (Fig. 18)**

Botanical description: Habit—Shrub or low tree, no taller than 12ft. **Leaves**—Alternate and entire, usually rather narrow. **Flowers**—Tubular, in axillary or terminal cymes, red, yellow, greenish, or white, often very fragrant; 5-lobed. **Fruit**—Reddish to blackish berry.

Distribution: Cultivated in gardens. Occurs as a garden escape at Mangonui, North Auckland.

General: Species of *Cestrum*—*C. elegans* Schlecht., *C. fasciculatum* Miers., *C. aurantiacum* Lindl., and *C. pseudo-quina* Mart.—on several occasions have been responsible for deaths in cattle in New Zealand. Any cestrums occurring in gardens are likely to cause stock poisonings. Poisonings caused by cestrum have been reported from abroad. Commonly plants are trimmed and the clippings thrown over fences where they are easily accessible to cattle, which eat them and die. Stock, and more especially cows, have been known to graze the shrubs with fatal results. All parts of the plant are poisonous and dried clippings are as toxic as the fresh plant. Care should be taken in the disposal of clippings from hedges and gardens. Cestrum poisonings appear to have been restricted to the northern part of the North Island, but a poisoning was reported from Feilding in 1944.

Symptoms of poisoning are generally gastro-enteritis and acute pain. Some congestion appears on post-mortem examination.

Poisonous principle: *C. aurantiacum* contains a water-soluble substance of an extremely irritant nature.

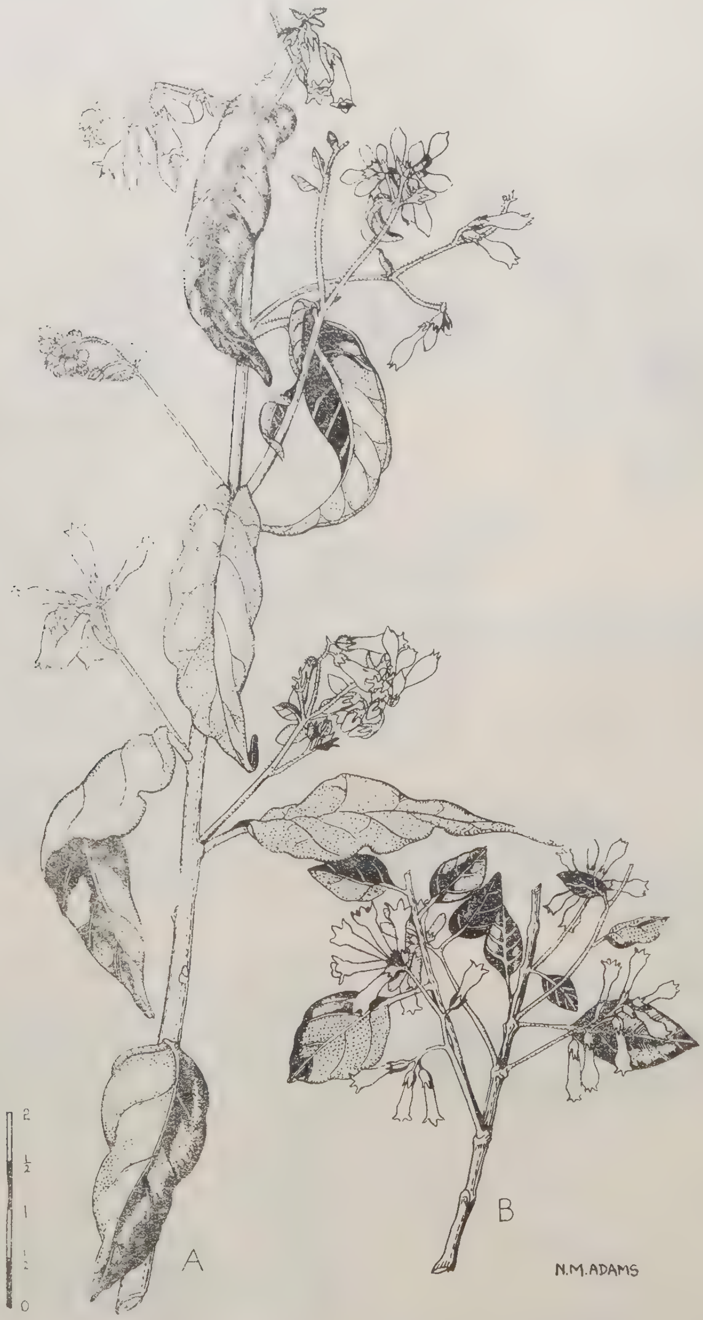

Fig. 18—A: Cestrum (*Cestrum elegans*). B: *Cestrum* sp.

BOOK REVIEWS

"Farming for Beef": Dr. Allan Fraser

DR. FRASER, of the University of Aberdeen, points out and discusses many of the urgent problems of internal beef production in the British Isles.

The responsibility for the low level of beef production at present is laid at the door of the authorities who have, perforce, tended toward milk production with consequent improvement in the dairy breeds, resulting in a low-quality "beef" frequently being put on the market from culled dairy cows.

Dr. Fraser contends that dual-purpose-type cattle could well maintain the average milk yield of the country; thus such cows could be used for beef production in addition to liquid milk production and for maintaining a more reasonable balance between beef and milk. This state could only be brought about by a better balance between the rewards of beef and those of milk preferably by a reduction in the price of liquid milk.

By sifting out important details of breeding and feeding methods, Dr. Fraser has given pointers to the farming community which might be said to steer a middle course in the need for beef production in a country of traditional eaters of beef. His discussions on the varied needs in regard to animal types and feeding methods for the different types of country in the British Isles, from the mountains of Scotland to the hills of Wales, show his unrivalled knowledge of these problems.

This book should be a valued addition to the library of New Zealand farmers who have beef animals on their farms. Naturally some of the methods would not apply in this country, but much of the book contains information on beef production which has not previously been available in such an easily readable form.

—*I.M.M.*

Crosby Lockwood and Son. 10s. 6d. net.

Sheepfarming Annual, 1950. Massey Agricultural College, 10s.

Sheepfarming Annual, 1950, just published by Massey Agricultural College, contains much helpful information on a wide range of subjects, many of which are of topical interest to the sheep farmer on hill or flat country. The 1950 edition, which as in other years is based on the addresses and discussions at the annual 3-day meeting of sheep farmers at the college, adds further easy reference to the results of some of the latest research and to the experiences of leading farmers. Several of the research projects are very timely.

CHANGES OF ADDRESS OF "JOURNAL" SUBSCRIBERS

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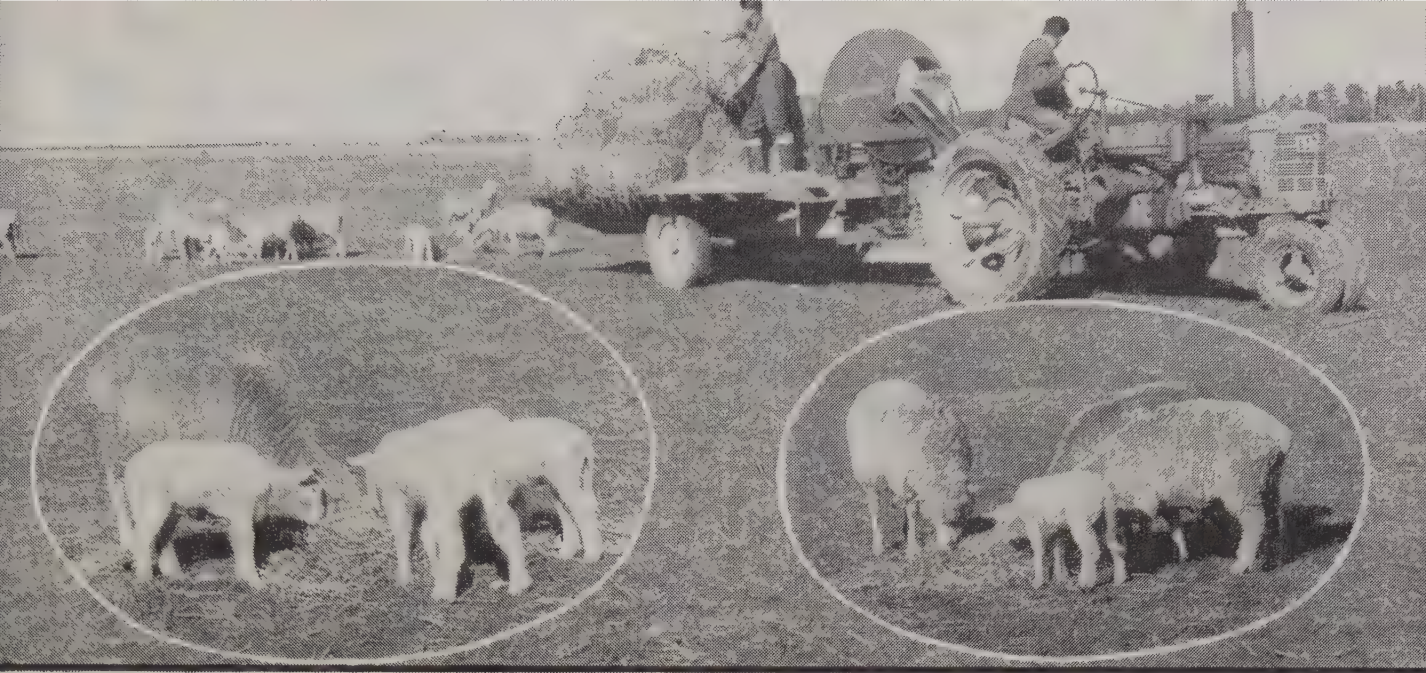

HEADING ILLUSTRATION: Feeding out rolled bales of lucerne hay through slicer fitted on trailer.

Lucerne Hay for Wintering Sheep in Canterbury

By F. G. SPITE, Instructor in Agriculture, Department of Agriculture, Rangiora

THE importance of the hay crop as a means of providing winter feed for sheep in Canterbury has increased tremendously over the past 20 years. Turnips were formerly used on most mixed farms to provide the bulk of winter feed, but the unreliability of this crop, as shown in the number of failures due to pests and weather conditions, has led farmers to turn to other ways of providing winter feed. Lucerne as a hay crop has become of prime importance on many Canterbury mixed farms and its value for winter feeding, together with the improvement in pastures that has taken place over the past 10 years, has enabled farmers to reduce the area required for supplementary crops.

THE seasonal nature of New Zealand's pasture production is intensified in the more southerly districts, and in Canterbury there are clearly defined periods when the growth of grass is insufficient to meet the requirements of stock. On the other hand, spring and early-summer production is in excess of the needs of grazing animals.

In purely pastoral areas a levelling out is achieved by shutting for a hay crop paddocks not required for grazing in spring. In most parts of Canterbury the position is complicated by the large part cash cropping plays in the farming programme. The harvesting of small seeds is especially important, and in arable areas throughout Canterbury many paddocks which would otherwise be saved for hay are used for the production of grass and clover seeds. The straw from seed paddocks is often baled and is useful for feeding to dry stock. Because of its low feeding value, it cannot be recommended as winter feed for breeding ewes.

In most seasons on light land it is difficult to save sufficient hay from pastures. Lucerne has proved to be of the greatest value both as a hay crop and for grazing during the dry summer period when grass growth is practically at a standstill.

Turnips, swedes, and green fodder crops are the chief supplementary feed crops in Canterbury, but the area sown annually in these crops is becoming progressively reduced, owing mainly to the large number of failures caused by disease and climatic factors.

Chou moellier and cereal greenfeed crops are more reliable than turnips and swedes and fit in well with the cropping rotation on most Canterbury farms. A good crop of chou moellier could be expected to feed 20 to 25 ewes per acre for 100 days. To obtain the maximum value from chou moellier and greenfeed the paddocks should be "on-and-off" grazed.

Lucerne in Canterbury

In Canterbury during the 1947-48 season 19,368 acres of lucerne were cut for hay and silage, with a total yield of 47,402 tons and an average of 2.45 tons per acre.

In the following table is shown the increase in the area of lucerne cut for hay and silage and in the area saved for small seeds and their relative importance in contrast to the declining acreage sown in turnips and swedes in Canterbury during the period 1936-37 to 1947-48. (The acreages given are an average for the 3 years in each period.)

Period	Lucerne cut for hay and silage (acres)	Area cut for small seeds (acres)	Turnips and swedes (acres)
1936-37 to 1938-39	8,340	44,985	122,155
1939-40 to 1941-42	10,985	66,549	104,699
1942-43 to 1944-45	17,702	86,980	89,830
1945-46 to 1947-48	18,133	112,086	94,199

Lucerne will grow well on a wide variety of soil types, provided the fertility is reasonably high and the drainage adequate. In poorly drained soils such as that on the clay downs attempts to establish lucerne have met with little success.

Sowing lucerne immediately following pasture very often results in a grassy stand, as the land has usually had insufficient time for decomposition of the turf. Lucerne cannot be expected to give of its best if sown following a normal cropping rotation. Very satisfactory results are obtained if grassland is ploughed in November-December, worked down, sown in greenfeed oats or barley in February, the crop fed off, and the land ploughed in September-October for lucerne. On land of high fertility a grain crop may be taken before the greenfeed is sown.

In the young stages lucerne plants are unable to compete successfully with a strong growth of weeds and a thin stand is very difficult to improve by oversowing.

Where twitch is not present the land should be worked down to a seed-bed as early as possible, using the grubber and harrows. Thereafter it should be frequently harrowed and rolled to destroy weed seedlings and at the same time consolidate the ground. If twitch is present, the land must be kept rough and worked with the cultivator until a satisfactory kill has been obtained.

In areas where a lime deficiency occurs it is a good and common practice to apply a dressing of 1 ton of lime per acre to the paddocks before sowing. After the application of lime the land is harrowed to cover wheel marks and rolled ready for sowing.

Until a few years ago the most productive strain of lucerne available was Marlborough, although a few overseas varieties have given quite satisfactory results. In 1946 an improved strain, developed from a selection of Marlborough lucerne, was released by the Agronomy Division of the Department of Scientific and Industrial Research. Seed of this strain is under certification by the Department of Agriculture and is rapidly becoming popular among farmers. The Certified strain of lucerne has the advantage of combining high production with uniformity of type and a greater proportion of leaf to stem.

Sowing Lucerne

Seeding rates in Canterbury vary from 8 to 18lb. per acre, the most popular being about 14lb.

Inoculation of seed with a culture of nitrogen-fixing bacteria is carried out almost universally and can be regarded as essential. The culture is produced by the Plant Diseases Division of the Department of Scientific and Industrial Research, Auckland, and is available to farmers through grain and seed merchants.

There is considerable controversy among farmers as to the best time to sow lucerne, and the answer to this problem varies with the district concerned. On light land autumn-sown stands are frequently destroyed by grass-grub in the first year, whereas spring-sown stands are far enough advanced to recover from an attack.

In districts where grass-grub is prevalent and where the land is relatively free from fat-hen it is advisable to sow during September or October. If spring weeds are troublesome, sowing is best carried out in late January or early February.

Lucerne should be drilled on a rolled surface, using worn coulter tips on the drill, as placing the seed more than 1in. in the soil is generally fatal to establishment. As most drills will not sow 14lb. of lucerne seed per acre, it is necessary to mix the seed with the manure. The seed should be drilled with reverted or serpentine superphosphate, as straight superphosphate injures the bacterial culture. Serpentine or reverted superphosphate is applied at the rate of about 2cwt. per acre.

Maintaining Lucerne Stands

Newly established lucerne is usually overshadowed by a strong growth of annual weeds in spring. Topping with the mower should be carried out and the cut material raked off to allow light to penetrate. At this stage topdressing with 1cwt. of reverted superphosphate per acre is advantageous. An annual dressing of reverted superphosphate at the rate of 2cwt. per acre either in autumn or spring is necessary to maintain a vigorous stand. Liming is best carried out in late autumn after the last cut has been taken, and on most Canterbury soils dressings of 1 ton every 2 years should meet requirements. Unless the lucerne stand is practically run out, topdressing with reverted superphosphate will do more to control weed growth than will cultivation. If, however, cultivation is considered necessary, the best implement is the grubber fitted with fine points. The work should be carried out in autumn. A bushel of Algerian oats per acre, sown on the grubbed stand, will suppress weed growth and provide useful fodder.

Lucerne Hay

Many of the factors involved in haymaking are beyond the farmer's control, but he can influence the quality of the hay by cutting lucerne at the right stage of growth. From flowering onward there is a rapid increase in the proportion of fibre and a corresponding decrease in digestive nutrients contained in the plant. The lucerne is approaching maturity when the leaves at the base start to turn yellow and new shoots rise from the crown. A good indication of cutting time can be obtained from observation of the lower leaves and the young basal shoots.

Drying is hastened by tedding the crop while the lucerne is still green, and to avoid loss of leaf this operation should be carried out when the crop has been cut for about 24 hours. As an alternative to tedding some farmers use the aerator, which has a lifting action that is less severe than the tedder. Results from the use of this implement have proved very satisfactory. Opinions as to when the crop should be windrowed vary, but good results have been obtained when it is left in the swath until the top layer is wilted. Winds are of much greater value in drying hay than is sunshine alone and, under good conditions, it would be 2 or 3 days before an average crop is ready for windrowing. It is desirable to make thin windrows in case rain falls before the hay is baled or stacked. After baling it is necessary to leave the bales in the paddock for 2 or 3 weeks to allow heating to take place and dissipate freely. Conditioning is hastened by stooking the bales in threes. To avoid the weather risk, temporary loose stacks can be built in the paddock by stacking the bales on the narrow edge, allowing air to circulate freely throughout. The hay is left in these stacks for a few weeks and when all signs of heating have disappeared it can be stacked permanently under cover. Adequate protection from weather and from stock is essential if hay is to be stored in good condition.

Winter Feeding of Ewes on Hay

On many Canterbury farms lucerne hay is of the utmost importance in the successful wintering of the ewe flock. With advancing pregnancy the requirements of the breeding ewe become greater and, if lambing troubles are to be avoided, it is essential that the flock be well fed during the last 6 weeks of the gestation period. During the critical months of July and August greenfeed or saved grass should be fed in addition to the diet of lucerne hay.

A sheep-feeding experiment conducted some years ago at the Ashburton Experimental Farm will serve to illustrate the potentialities of lucerne hay as a winter supplement for breeding ewes.

For trial purposes a pasture of 16 acres was divided into two blocks, each of 8 acres, care being taken to ensure that sward conditions were comparable on each area. The one block with ewes on pasture alone and without supplementary feeding wintered only 2 ewes per acre. Where, on the other area, the pasture was supplemented with a daily ration of 3½lb. of lucerne hay per sheep the wintering capacity was increased to 10 ewes per acre and the sheep came through the period in good condition.

It is difficult to estimate the daily requirements of sheep fed on hay, but it is a good general rule to feed out as much as the flock will eat in a day without waste. An average figure would be about 1½ to 2½lb. of lucerne hay per day in addition to greenfeed and available grass. On the basis of a 100-day winter, 3 bales of hay per ewe would be required for wintering in Canterbury.

A North Canterbury farmer who winters a flock of 600 ewes and 200 hoggets successfully on lucerne considers that there is practically no wastage with hay fed to the older sheep. The hoggets and 2-tooths in the flock eat very little of the hay until toward the end of winter. This farmer aims at providing 50 tons of hay annually for wintering the flock, supplemented by 20 acres of Algerian oats for greenfeed.

As far as possible hay should be fed out on the lightest and driest paddocks of the farm. With larger flocks, spreading the hay thinly in rows is widely practised by farmers, the position of the rows in the paddock being varied from day to day to avoid concentrating the stock in a small area. It is preferable to feed out a day's supply only, as fresh hay is much more palatable and wastage is less. In small flocks feeders are sometimes used. These should be of a type which are easily moved or poaching becomes severe in the vicinity.

On Canterbury arable farms as much as 139,295 acres (1946-47 figures) may be harvested annually for grass and clover seeds. In a purely pastoral district a great deal of this area would be used as a hay crop, thereby levelling pasture production to the needs of stock. The need for a special-purpose hay crop is therefore greater in a small-seeds-producing area than in districts where pastures are used for grazing only.

Although not all farms have land suitable for growing lucerne, there is a large area of land in Canterbury from which production is at present of very little value. If lucerne were sown in suitable paddocks, the carrying capacity of these farms could be materially improved.

Before the advent of the pick-up baler the labour required for stacking and feeding out made haymaking unpopular among farmers. The large increase in the area of lucerne in Canterbury over the past 15 years is partly the result of the improved methods of harvesting the hay crop. Although this increase has taken place, the area is still not sufficient, as is shown by the annual demand for good lucerne hay and the high prices paid.

The Home Garden in June

By H. P. THOMAS, Vegetable Instructor, Department of Agriculture, Wanganui

LITTLE sowing and planting is advised for June. Cultivation among growing crops should be done whenever the state of the ground is suitable and the taller-growing crops may need earthing up. Ground from which crops have recently been harvested should be cleared and dug over and either sown with a quick-growing green crop such as mustard or left rough to gain the benefits of weathering. Green crops of blue lupins which have reached the full-flowering stage may be dug under, especially when growing on ground required for spring sowing. It is time to prepare the ground required for new asparagus or rhubarb beds. Particular attention should be paid to providing drainage and shelter if these essentials have been found inadequate. Garden fences, gates, trellises, kerbings, etc., can be checked over and necessary repairs done. On wet weekends the tool shed can be tidied up and garden equipment can be cleaned, sharpened, and repaired. Orders should be placed early for garden equipment, seeds, manures, and spray materials. Vegetables in storage should be sorted over and any showing signs of decay should be removed.

[*Green and Hahn Photography Ltd. photo.*

Broad beans are one of the few vegetables which may be sown throughout winter. Cool conditions suit this variety of bean, which provides a welcome addition to the limited range of vegetables available in spring.

AT this time of year the home gardener will become aware of any shortcomings in the previous planting programme undertaken for the production of winter supplies. If successive sowings have been kept up during summer and autumn, there should be a varied choice of vegetables for harvesting in June. Though the kinds available may vary slightly from district to district, where proper planning has been carried out many of the following kinds should be ready during winter: Carrot, parsnip, swedes, savoy cabbage, broccoli (winter cauliflower), brussels sprouts, celery, leeks, curly kale, silver beet, spinach, and winter rhubarb.

Cautious Approach to Sowing and Planting

Unless conditions are especially favourable, sowing and planting must be undertaken with extreme caution. Because of their positions and the climatic conditions prevailing most gardens do not lend themselves to planting and sowing before July. Broad beans may be sown if shelter and drainage are good and lettuce, spinach, cabbage, and cauliflower seed may be sown in sheltered, warm seed-beds. Cauliflower and cabbage plants may be set out where the situation is not too exposed and winter conditions are comparatively mild.

The sowing in open situations of most other hardy vegetables, such as peas, carrot, turnip, and silver beet, is better delayed until at least July, and in some districts it is advisable to delay sowing until August or September; experience should be the main guide.

REMINDERS FOR JUNE

Sow: Broad beans, cabbage, cauliflower, spinach.

Plant: Cabbage, cauliflower.

Except in favourable situations in the North Island where drainage and soil conditions are good, it is not advisable to sow or plant the following in the open ground in June:—

Sow: Peas, radish, spring onion, carrot, turnip, silver beet, beetroot, lettuce.

Plant: Potatoes.

[*Sparrow Industrial Pictures Ltd. photo.*

Only good strains of rhubarb should be grown, as there is a great difference in quality and yield between good strains and poor ones. Six plants should supply ample stalks for the average family.

With less sowing and planting at this time of year more time is available for other important work such as digging, tidying up generally, and attending to the many odd jobs of repairs. It is not advisable to attempt any cultivation on heavy soils, particularly if wet conditions prevail, as pugging will occur, and careful treatment will then be required to restore the soil to good condition. However, soils which are inclined to pack down after heavy rains benefit greatly by repeated surface cultivation during good weather and by the addition of humus to improve the soil structure. The growth of plants depends largely upon good growing conditions for their roots and poorly aerated soils soon inhibit root activity.

Standing crops of winter greens and autumn plantings of spring cabbage and cauliflower should benefit from applications of organic liquid manure or of sulphate of ammonia or nitrate of soda at the rate of 1oz. of either to 4 gallons of water.

Celery and leeks should receive their final earthing up if this work has not already been done. Broccoli (winter cauliflower) should be watched for

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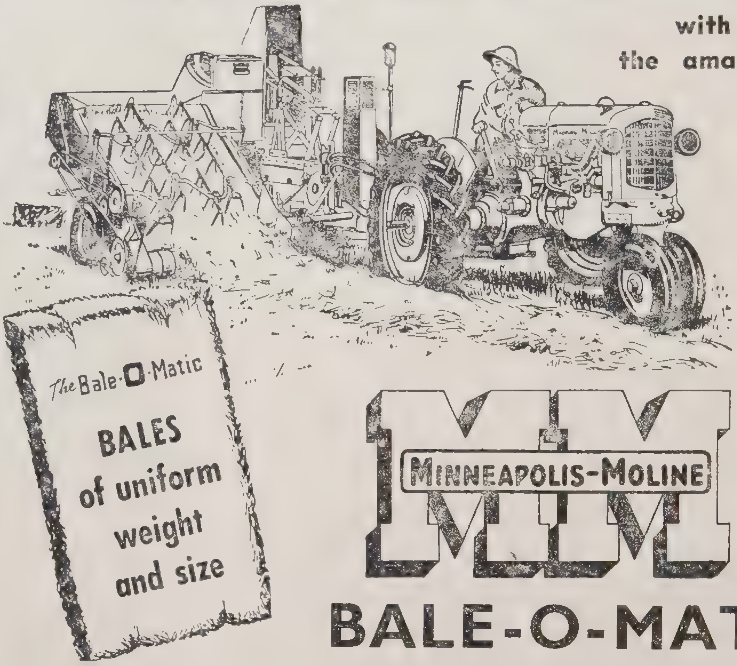
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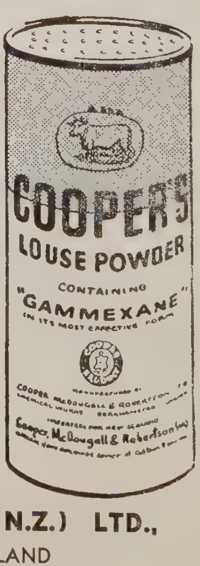

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signs of approaching maturity, and in the cooler districts developing curds should be protected by breaking a leaf or two over them.

Moulding up Crops

To assist with soil drainage and to give the plants support during winter it is a good practice where row spacing permits to mould or bank up soil along the rows of late-winter crops such as savoy, broccoli, brussels sprouts, etc. If the work has not been done already, established asparagus and rhubarb beds should be mulched with compost or a light dressing of farmyard manure and soil.

All waste material from recently harvested crops, fallen leaves, tender hedge clippings, lawn clippings, etc., should be added regularly to the compost heap.

The pleasure of gardening can be increased by using good tools which have been kept in good order. The following is considered a suitable outfit for the average home garden: Spade, fork, long-handled shovel, draw hoe, push hoe, rake, hand cultivator, small fork, trowel, thinning and weeding tool or knife, hedge shears, garden line, spray pump, lawnmower, and wheelbarrow. A dry shed should be used for housing all tools, including the wheelbarrow. Oily waste or rags should be kept handy for cleaning them before putting them away, as this will keep them in good condition and prolong their life.

Sorting over and cleaning of stakes and tidying up and labelling of manures and sprays left over from last year's activities may also have to be done.

Asparagus

If it is intended to plant a new asparagus bed, it is advisable to begin preparations now. Asparagus beds last for many years and time and effort expended in their proper preparation will be amply repaid. Asparagus is not difficult to grow, and thrives best in a loam containing a large proportion of sand. Rich alluvial soils are ideal, and if such conditions can be approximated in the home garden the crop should do well.

Although asparagus needs a fair amount of moisture when growing, good drainage is essential, as stagnant water in the soil will gradually kill the plants.

Beds may be 3ft. 6in. to 4ft. wide and the ground dug at least 2ft. deep. The bottom spit should be thoroughly broken up, and at the same time a heavy application of organic manure, together with any available wood ashes or soot, incorporated throughout. In addition it would be an advantage to apply a mixture of 2 parts of blood and bone, 1 part of superphosphate, and 1 part of sulphate or muriate of potash, all by weight, at 2oz. per square yard.

Planting is not advised until the end of July in the North Island, and until August or even September in the South Island.

Broad Beans

If sowings of broad beans have not previously been made, a late sowing made now will provide a welcome addition to the limited range of vegetables available in spring. Broad beans are not particular as to soil, though the plants do best in heavier soils which have been well manured for an earlier crop. They are particularly hardy and suited to cool conditions. Further cultural directions were given in last month's "Journal."

[*Sparrow Industrial Pictures Ltd. photo.*

Green cover crops such as blue lupin may be turned under in June, particularly if they have reached the flowering stage.

Cabbage and Cauliflower

Seed of cabbage and cauliflower for August planting can be sown now. The round, smooth-leafed type of summer cabbage is excellent for present sowing; given good conditions and treatment, it is quick maturing and tender and does not grow too large.

Varieties of cauliflower such as Early London, Walcheren, and All Seasons are suitable for sowing now in most districts for planting out in early spring.

Seed should be sown in a sheltered bed with a favourable aspect, in a frame or cool open glasshouse, or in seed boxes. If seed is sown in boxes, ample depth for root growth and good drainage should be provided and seed should be sown thinly to avoid drawn, weakly plants. Crowded plants create conditions suitable for development of mildew or damping off later.

The seed-bed for cabbage and cauliflower should be deeply and thoroughly cultivated and the soil enriched with compost or other well-rotted material. Lime should be applied to most soils not recently dressed at 2 to 4oz. per square yard. The seed may be broadcast thinly in beds, but for convenience in weeding and for ease of lifting it is better sown in rows 12in. apart. In heavy soils seed should not be sown more than ¼in. deep.

Planting Out

Cabbage and cauliflower plants can still be set out in localities where winter conditions are not too severe. In districts having a mild winter the smooth-leafed, round cabbage is often preferred to the hardier, pointed types, because the latter tend to become too coarse under warm conditions.

A well-drained fertile soil is desirable if good-quality produce is to be grown from these winter plantings.

Varieties

Suitable varieties for sowing or planting this month are:—

Cabbage: Flower of Spring, Enfield Market, Jersey Wakefield, and First Early (pointed types); Golden Acre, Early Ball, Vanguard, and Copenhagen Market (round-headed types).

Cauliflower: Good hardy varieties are Walcheren, All Seasons, and Phenomenal (5 months).

Lettuce

Lettuce for spring cutting may be sown in June, but special preparations and care are needed. The seed should be sown thinly in a seedling box filled with a mixture of good soil and sand and then covered lightly with fine soil. The box should be placed in a warm sunny position and covered with a sheet of glass until the seedlings appear. Watering of the soil in the box should be done before sowing and this watering should be sufficient until after the seedlings appear.

When the plants are large enough to handle prick them out into boxes, allowing 2in. each way between plants. This should give sufficient room for the seedlings to develop into sturdy plants for setting out in the garden.

For planting out, plants should be about 4in. high, and a warm, well-drained position should be prepared for them beforehand. A frame is preferable, because plants can be protected from inclement weather with scrim or glass.

At this time of the year raised beds will give additional warmth and drainage, and a width of 4ft. is convenient for weeding and after-care. The following fertiliser mixture worked into the soil about a week before planting should benefit these early plantings: 5oz. of superphosphate, 4oz. of dried blood, ½oz. of sulphate of potash, and ¼oz. of sulphate of ammonia to each square yard.

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Plants may be set out 9in. apart in rows across the bed, with 12in. between the rows.

If the bed is not naturally well sheltered from cold winds, protection will have to be provided; manuka or sacking fence should suffice.

Varieties: Imperial 615, Neapolitan (winter strain), and All the Year Round.

Potatoes

Planting dates for potatoes vary according to locality, and the danger of late frosts must always be considered before setting out seed. Nothing is gained by planting early and then having plants cut down by frost.

In well-situated, warm borders in favourable localities in the North Island a small planting could be made toward the end of June, but all top growth should be earthed up until danger of frost is past.

Sprouting Tubers

Most home gardeners will be content to set out tubers of an early variety for sprouting. Government Certified seed, although dearer than uncertified seed, will be found to produce more vigorous and disease-free growth with a higher yield.

Whole potatoes are best for early planting and tubers of uniform size should be chosen and placed in single layers in shallow trays, with the broadest or "rose" end uppermost.

[*Sparrow Industrial Pictures Ltd. photo.*

Potatoes for planting later in the year can be selected now and placed in boxes with the broader or "rose" end up. Store the seed in a light, airy, frost-free shed.

Care should be taken to see that the sprouts do not grow too long (¼in. to ½in. is ample) before planting, as long sprouts are more likely to break off when tubers are planted. The production of well-formed sprouts is important though not essential in success with early potatoes. The advantages are that only the top eyes break into growth and thus the strongest shoots are produced and root development begins soon after planting. Any tubers that fail to sprout can be discarded before planting, thus reducing misses to a minimum.

The boxes or trays should be kept in a light, airy, frost-free shed. If they are stored in a dark corner, weak spindly shoots will develop which will not produce healthy plants of high productivity.

It is not necessary to sprout main-crop potatoes in this way.

Organic matter such as stable or farmyard manure may be applied some time in advance of planting or a fertiliser mixture of equal parts of blood and bone and superphosphate and 3 per cent. of sulphate of potash may be used at the rate of 12oz. to 12ft. of row.

Plant tubers 4in. deep with 12 to 14in. between the sets. After planting, ridge the soil up over the sets, as this improves drainage and the soil consequently is warmer. Keep the ground well worked and earthed up round the stems.

Varieties: Epicure, Cliff's Kidney, and Arran Banner are recommended for early planting.

Rhubarb

June is a suitable month in which to begin replanting or extending a rhubarb bed. Division and replanting of rhubarb are usually advisable after 4 years' growing in the same place and crowns can be lifted now or during July if growth has been declining. Dormant rhubarb crowns are very hardy and after lifting may be left in a cool shaded spot until new buds begin to swell. The everbearing or winter varieties may also be divided at this time, but immediate division and replanting are advisable.

Splitting or dividing of crowns is usually done by using a sharp spade or knife and making a clean cut. A suitable section for replanting should have one or two prominent buds and a portion of root.

Good drainage is very important and the site of a new rhubarb bed should be trenched. If necessary, the area should be drained by field pipes or by burying stony material deeply to form a moraine drain. The bed should not be beneath trees. Because of the semi-permanent nature of a rhubarb bed perennial weeds such as couch grass, convolvulus, or oxalis should be removed from the site. The soil should be rich in such organic matter as farmyard or poultry manure, compost, or well-rotted stack bottom. Rhubarb is a vigorous-growing plant and where strong crowns have been planted in well-drained soil, the amounts of manure applied in most home gardens, even if heavy, are unlikely to be excessive.

When the crowns are replanted they should be covered with soil to a depth of 1 or 2in. and set out 24 to 30in. apart.

Attention to Existing Beds

Standing beds should be kept weed free and will benefit from a liberal dressing of compost or farmyard manure lightly worked into the soil. Care must be taken not to injure the crowns or roots.

Spinach

A further successive sowing of the winter variety of spinach may be made in June.

Spinach thrives best on well-drained, fertile soils which should not be lacking in lime, as the plant will not thrive under acid conditions. Soil into which a green-manure crop has been dug for a previous crop may require 3 to 4oz. of lime per square yard. The seed may be sown in rows 12 to 15in. apart, and shallow cultivation should begin as soon as the plants are plainly visible. Nitrate of soda (1oz. per square yard, or in liquid form 1oz. to 4 gallons of water) may be applied when the plants are half grown. This will assist the crop to mature early, particularly on light soils and during cold weather.

As quick growth is necessary to produce tender, succulent leaves, do not let the plants suffer from lack of water.

The prickly seeded or winter variety of spinach, Giant Prickly, is grown at this time.

Ways of Adding Humus to Soil

The constant harvesting of good-quality crops depends on the maintenance of soil fertility, and regular and systematic replenishment of organic matter in the soil is one of the best ways of maintaining soil fertility, and improving soil structure.

Every crop harvested leaves the ground poorer because plants have taken from the soil considerable quantities of plant food during their growth. Organic matter and plant food should be added to the garden continually to replace that which is removed by crops. The following materials, which will be available to most home gardeners, can be used to improve the soil: Lawn and soft hedge clippings, farmyard manure, old stack bottoms, crop refuse, green cover crops, leaf-mould, mulches, compost.

Lawn and Soft Hedge Clippings

Lawn or soft hedge clippings should be collected as they become available and dug directly into the soil, though composting of them with other material is considered advisable where possible. The resultant humus can then be used for crops or it may be incorporated throughout the surface soil during digging.

Farmyard Manure

Farmyard manure is not usually available to all home gardeners, but a small supply can often be obtained even in towns and cities. Farmyard manure varies greatly in plant nutrients, as much depends on the type of animal and on the food that it consumes. Apart from its plant-food content farmyard manure improves the physical condition of soils. As a rule farmyard manure should be used when it has become old and well decayed. Horse manure is loose textured, but as it is often relatively deficient in phosphate and potash, the addition of

[*Green and Hahn Photography Ltd. photos.*

Making compost. Left—Large heaps are much more satisfactory than small heaps if compost is made in the open. For best results heaps should contain not less than 1 cub. yd. of material. Right—For making small quantities of compost, boxes or bins are recommended. A container such as that shown is convenient, efficient, tidy, and protects the compost from extremes of weather.

small quantities of these will make it a better-balanced manure for all purposes. The addition of urine and litter from the stable gives farmyard manure greater value.

Cow and pig manures do not contain as much available plant food as stable manure and they are not so useful on heavy soils. They are, however, especially useful on light or sandy soils in binding the soil and making it more retentive of moisture.

Sheep and fowl manures are high in plant-food content, but unless they are collected fresh and stored in a dry condition, much of their ammonia content will be lost. Alternate layers of fowl manure and soil should be placed in a heap and later mixed well before distribution.

Farmyard manure can be used with advantage in the compost heap or by being incorporated in the soil during digging operations.

Old Stack Bottom

Old stack bottom is more likely to be available to the farm gardener. It is an excellent form of humus, and is especially valuable for heavier soils because it also improves their physical condition.

Crop Refuse

After the harvesting of many crops a great deal of crop refuse is left. Providing the refuse is reasonably free from insect pests and diseases, it is an excellent material for inclusion in the compost heap.

If direct digging in is resorted to, refuse such as cabbage remains requires cutting up well before turning in, to assist with the decomposition of the older and tougher parts.

Green Cover Crops

Whenever ground becomes vacant, particularly in autumn, cover or green crops should be sown particularly if farmyard manure, compost, and other organic material are not available. Many plants can be used for green manuring, such as mustard, oats, barley, vetches, clover, and blue lupin; the last three are especially useful in improving the nitrogen content of the soil.

The choice of a particular cover crop will depend on the time of sowing and the length of its growing period.

Agricultural mustard produces much soft growth within a period of up to 14 weeks, whereas blue lupin (a favourite crop for autumn sowing) takes approximately 20 weeks to reach the flowering stage, which is considered the best time to dig it in.

Leafmould

Dead leaves are a natural manure and mulch for plants, especially shrubs and trees. All leaves which cannot be dug in should be put in the compost heap or gathered in heaps and allowed to decompose partially. Although the resultant leafmould is valuable mainly for its humus content, it also contains valuable plant food.

The best leafmould is indispensable for potting composts, and the material is also very good for mulching vegetable plants, herbaceous borders, or shallow-rooted shrubs such as azaleas and rhododendrons.

Mulches

Mulches can be used to good advantage with vegetables and many other crops, and most of the materials mentioned can be used with good effect. Mulching means the surface application of material through growing crops, particularly around the root area. This material eventually rots down and becomes incorporated with the topsoil. Humus applied in this and many other ways improves plant growth and plant health.

Composting

A compost heap is the means of obtaining a really good form of humus. It should not mean an untidy pile of grass cuttings, weeds, etc., heaped up in a corner against a fence. Properly made, humus ensures first-class organic manure from waste and refuse at little cost. It is a means of utilising to best advantage all waste material from crops, weeds, leaves, hedge and lawn clippings, kitchen refuse, and animal manure.

The compost heap should be made so that conditions are favourable for the growth of micro-organisms which hastens decay. Thorough mixing is essential.

Coarser material should be well spread through the heap, so that wastes which decompose more quickly will assist in breaking down the coarser material. Lawn clippings and leaves should be spread thinly over the heap or they tend to mat and exclude air, which is necessary for decomposition. The area of the garden will decide the size or number of heaps or bins to be made. There are two methods of building a compost heap. One is to have an open heap and the other is to obtain or build a bottomless box 3 to 5ft. square and 4 to 5ft. high. The average home gardener will find the box method a great advantage over the small heap, as it is tidier and more easily managed.

For the site of a heap choose a position sheltered from heavy rain and drying winds. Successful compost making depends largely on the maintenance of the right temperature and moisture and prevention of acidity in the heap.

The finished product of a well-managed heap should be ready for use in 3 to 4 months in the warmer weather, but during the colder part of the year it may be 6 to 7 months before material is ready.

The greatest value from matured compost is obtained when it is applied as a surface dressing and lightly forked in. Do not set it down too deeply, but mix it well with the soil to a depth according to the type of crop to be grown.

The periodic and judicious use of compost and other humus-forming materials in the vegetable garden will be reflected in the quality of the crops.

National Pig Industry Council Losses Survey

By A. LONGWILL, Superintendent of the Pig Industry,
Department of Agriculture, Wellington

A SURVEY that was being initiated covering the incidence of losses among pigs on farms throughout New Zealand was mentioned in the March, 1949, issue of the "Journal". The report which is given below is a preliminary one, as the survey is being continued for a further year.

THE report, which covers nearly 25,000 piglets born, shows, however, that over 20 per cent. of all fully developed pigs born do not survive beyond a day or two after farrowing. Still-births and overlying account for these losses, and how these can be reduced poses a problem for further investigation. Though post-weaning losses are much smaller in number, their financial implications are, of course, more serious per head of losses because production costs have been incurred. These losses pose another husbandry problem.

There are variations in losses as between farms and it is hoped that a study of management practices on individual farms, following the current survey, will bring to light further information on practices which are sound in minimising losses and securing the best returns from pigs.

The Dominion average of between 9 and 10 pigs slaughtered per sow observed over the past decade draws attention to a low level of efficiency in the use of pig breeding stock and has led to an investigation into the reasons for this situation in an endeavour to place the industry on a more profitable basis.

With information obtained from pig recording clubs and the Department of Agriculture's official litter records and pig census as a background, the National Pig Industry Council has undertaken, in conjunction with the Department of Agriculture, a Dominion survey with the purpose of finding the relative importance of the various causes of losses in pig production.

Early Litter-recording Results

Analysis of the records of 467 litters recorded by the Waikato Pig Recording Club in 1932-33 and 1935-36 showed that the average number of pigs born per litter was 9.3 and that 7.3 were weaned, a loss of 22.7 per cent. up to weaning stage. Of the 4414 pigs born 974 pigs died before the weaning stage and the causes of loss recorded were as follows:—

TABLE 1—CAUSES OF DEATHS IN LITTERS

Cause	No. of pigs	Per cent. of total loss
Overlain	422	43.3
Born dead	312	32.0
Died at birth	120	12.3
Bad doers or runts (died or destroyed)	78	8.0
Other causes	42	4.4

Much has still to be learnt about the management of the in-pig sow. A careful check should be kept to see that she does not get too fat; the sow should be active and in firm condition.

Two litters, which were each reduced to three pigs, "boxed" and being reared by one of the sows.

Similar figures for the Manawatu Pig Recording Club for 1933 to 1935 and covering 4190 piglets born, of which 835 or 20 per cent. were lost before weaning, showed 48 per cent. of the total lost were born dead or died at birth, 42 per cent. were overlain, and 10 per cent. were runts or were lost through other causes.

Both sets of figures indicated that approximately 90 per cent. of the losses to weaning occur at or within a short time after farrowing, and too much emphasis cannot be placed on the importance of personal attention at farrowing, if these losses are to be avoided.

The records also revealed a wide range in the number of losses in different litters. Highest percentage losses did not occur in large litters, as might be expected, but in smaller litters. The explanation, which it was thought a larger survey might confirm, is probably that the influence of good all-round management is not only reflected in small losses but in large litters of heavy pigs born and heavy weaning weights.

Official litter records covering a larger number of litters (1325 litters and 12,411 pigs born) indicated a loss between birth and weaning of 20.6 per cent. of total births. The percentage loss was not reduced to the extent which might have been expected in view of the fact that sows nominated for official litter recording were probably given special management.

Use of Breeding Sows

Data from the pig census collected by the Department between 1938 and 1943 showed a rising tendency in percentage losses. In 1943 returns there was an average of 1.5 litters per sow in the 12 months' period. This census involved 49 farms and 230 sows.

All records obtained over the past years emphasise the importance of management in reducing losses and in securing an increase in the number of pigs marketed. With a view to conducting investigation into problems of this nature and of providing advice to all concerned, the Technical Advisory Committee was set up by the National Pig Council Executive in 1948. This committee advised that the most urgent fundamental problem was the low number of pigs slaughtered per year per sow carried.

The possible factors involved were considered to be low fertility of breeding stock, number of litters per sow in a season, and the mortality rate. These factors could be investigated concurrently and this required a survey on a Dominion basis if an accurate picture of the incidence of losses was to be obtained.

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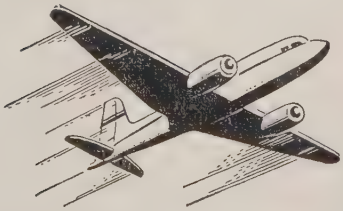

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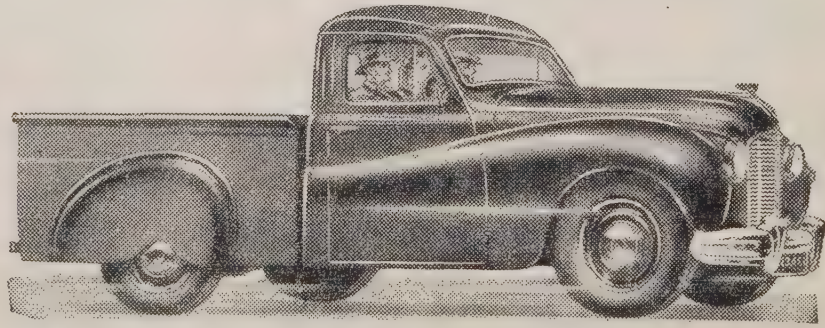

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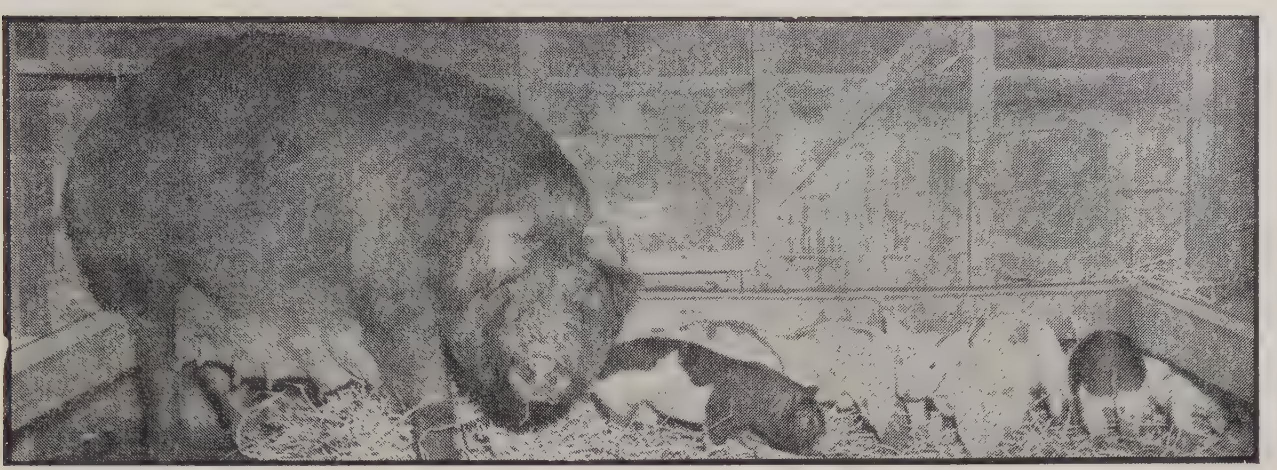


Properly designed farrowing rails may reduce losses caused by overlying.

A total of 900 farms was involved on a system which would permit statistical treatment of the data if returns were complete. At the first visit a number of these farms dropped out for various reasons, but 688 farms were regarded by the supervisors collecting the data as likely to supply worthwhile information. Returns were finally received from 277 farms only.

Some automatic selection had thus taken place and the results quoted below can be taken to be from somewhat better-than-average farms. In other words, estimates of losses arrived at are likely to be conservative when applied to the industry as a whole.

These farms averaged 1 sow to just under 10 cows in the dairy herds. This figure supports the contention above that these farmers paid more attention to pigs than the average. The over-all sow-cow ratio for the country (making no allowance, on the one hand, for milk going to town supply, drying, and other manufacturing processes and, on the other, for sows on other than dairying holdings) is about 1 sow to 25 cows.

TABLE 2—TOTAL PIGS BORN AND AVERAGE PER LITTER

District	No. of litters	No. of pigs born	Average pigs born per litter	Pigs born per sow per year
Northland	519	4,612	8.9	16.8
Auckland	78	720	9.2	18.0
Waikato	201	1,762	8.8	15.3
Bay of Plenty	716	6,386	8.9	16.6
Taranaki	191	1,721	9.0	15.5
Wellington	356	3,205	9.0	15.8
Canterbury	337	2,993	8.9	14.3
Otago and Southland	356	3,435	9.6	18.2
Total	2,754	24,834	9.0	16.3

TABLE 3—PIGS WEANED PER LITTER AND PER SOW PER YEAR

District	Total pigs weaned	Av. no. weaned per litter	Av. no. of litters per sow per year	Av. no. of pigs weaned per sow per year
Northland	3,552	6.8	1.88	12.8
Auckland	570	7.4	1.95	14.3
Waikato	1,341	6.7	1.67	12.1
Bay of Plenty	4,706	6.6	1.86	12.3
Taranaki	1,332	7.0	1.72	12.0
Wellington	2,407	6.8	1.75	11.9
Canterbury	2,394	7.1	1.61	11.4
Otago and Southland	2,717	7.6	1.88	14.4
Total	19,019	6.9	1.80	12.5

TABLE 4—TOTAL PIGS BORN AND LOSSES TO WEANING AS PERCENTAGE OF TOTAL BORN

District	No. born	Born dead, etc.	Per cent.	Runts or weaklings destroyed	Per cent.	Disease	Per cent.
Northland	4,612	936	20.3	66	1.4	65	1.4
Auckland	720	138	19.2	5	0.7	7	1.0
Waikato	1,762	386	21.9	27	1.5	8	0.5
Bay of Plenty ..	6,386	1,260	19.7	47	0.7	147	2.3
Taranaki	1,721	348	20.2	44	2.6	3	0.2
Wellington	3,205	688	21.5	52	1.6	61	1.9
Canterbury	2,993	501	16.7	25	1.7	45	1.5
Otago and Southland	3,435	630	18.3	36	1.0	20	0.6
Total	24,834	4,887	19.7	302	1.2	356	1.4
Total loss	5,545	22.3 per cent.					

Litters Covered and Pigs Born

Table 2 shows the total, by districts, of litters for which the records of losses up to weaning were recorded satisfactorily for use in this analysis, together with the total number of pigs recorded born and the average number born per litter.

Points worthy of mention are:—

1. The high degree of uniformity as between districts.
2. The fact that the average number born is slightly below that recorded by members of the pig recording clubs 15 years ago.

It was noticeable that almost all farmers completing returns aimed to secure two litters a year from each sow. Of 268 farms where a clear answer was given only 4, or 1.5 per cent., had no intention of securing two litters per year.

Table 3, which is based on a slightly smaller number of litters (some litters had to be omitted where the farm data were inadequate to arrive at an average figure for the number of sows) than Table 2, shows the average number of litters farrowed per sow during the 12 months' period. In the main, these are considerably above an estimate of the average for the industry as a whole (6.5 pigs weaned per litter and 10.35 pigs weaned per year or 1.6 litters per sow per year).

Number of Pigs Weaned

In Table 3 the total number of pigs weaned and the averages weaned per litter and per sow per year are also given on a district and total basis. (The number of sows used in calculating this average is the average number of sows on hand at the beginning and end of the period.)

Again the average figure is considerably above an estimate of the Dominion average based on sow returns and killing figures published in the Statistical Report on Agricultural and Pastoral Production.

Losses to Weaning

Table 4 is based on all pigs born as shown in Table 2 and gives the break-up on a district and total basis of the losses to weaning in the main categories.

By far the greatest proportion of the losses fall into the first category (88 per cent. of the total losses up to weaning). The variation between district averages in total loss to weaning is from 20 per cent. to 25 per cent. of total pigs born. On individual farms the range is from nil to 68 per cent., but the information given on shed sheets generally was inadequate to enable any attempt to be made to investigate the effect of management practices on the percentage loss.

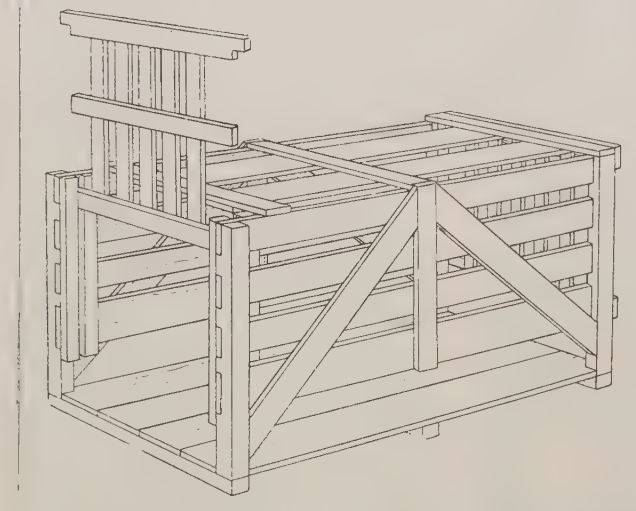
On 74 per cent. of farms the percentage losses to weaning lay between 10 and 33; 11 per cent. of farms had losses of 10 per cent. or less and 15 per cent. of farms had losses heavier than 33 per cent. These results confirm what has been observed previously: That by improvement in management it should be possible to effect a considerable reduction of losses on many farms, but the data collected have not indicated the importance of various factors in management, for example, personal attention at farrowing, controlled housing facilities, various artificial aids to reduction of overlying, and the influence of the condition or pre-natal feeding of the sow. More attention to observation of these factors is desirable in the 1950-51 survey.

Break-up of Losses to Weaning

In the case of 702 litters the losses were divided into pigs born dead, those which died at birth, and those overlain. The number of pigs born in these litters totalled 6916. (This is shown in Table 5.)

TABLE 5—BREAK-UP OF LOSSES TO WEANING

Cause	No. of piglets	Per cent. of total born	Per cent. of total losses to weaning
Born dead ..	709	10.2	32.7
Died at birth ..	576	8.3	26.5
Overlain	748	10.8	34.4
Runts or weaklings	88	1.2	4.0
Disease	49	.6	2.4



Farrowing crates, or hurdles having the same functions as the sides of crates but which allow the sow a little more freedom of movement, are used in some countries and may be worth a trial in New Zealand.

TABLE 6—TOTAL LOSSES

District	Pigs born	Losses: To weaning	Losses: After weaning	Total loss	Total loss as per cent. of pigs born
Northland	4,073	955	127	1,082	26.5
Auckland	720	150	22	172	23.9
Waikato	1,403	296	52	348	24.8
Bay of Plenty	6,386	1,454	354	1,808	28.3
Taranaki	1,721	395	62	457	26.6
Wellington	3,205	901	91	992	31.0
Canterbury	2,993	571	101	672	22.5
Otago and Southland ..	3,435	686	76	762	22.2
Total	23,936	5,408	885	6,293	26.3
Losses as per cent. of total pigs born ..		22.6	3.7		
Post-weaning losses as per cent. of pigs weaned		—	4.7		

The averages of these litters were 9.85 born and 6.86 weaned and the losses thus amount to 31.1 per cent. of pigs born, which is considerably higher than the over-all average. Further, there has probably been a certain element of guesswork in distinguishing between "pigs born dead" and "died at birth", as it is doubtful whether the farrowings were witnessed in many cases. However, this break-up is interesting in confirming the high proportion of losses occurring at, or shortly after, farrowing and in also confirming overlying as the predominant cause of losses of pigs which were born with a chance of survival. No attempt was made in this survey to determine the reasons for such a high proportion of still-births and no evidence has been forthcoming regarding means of reducing overlying, although as previously mentioned the greatly varying scale of losses points to the importance of general management factors.

Post-weaning Losses

In an analysis of the post-weaning losses the percentage of total losses occurring in each quarter and the percentage of the losses in each quarter represented by pigs at different stages of growth have been worked out. The distribution of losses is shown to be along the lines which would be expected, that is, losses are greatest in winter and spring, with losses tending to be heaviest among the lighter-weight pigs.

Weaners and slips account for 75 per cent. of the total post-weaning losses, except in the summer months. There are higher percentages of the larger pigs lost during the summer months (46 per cent. porkers and 8 per cent. baconers) probably due to the effect of heat on fat pigs and the increased likelihood of salmonella and pasteurella infections in this class of pig during warm weather and when it is being overfed with skimmed milk. Of the total post-weaning losses (Table 6) 69 per cent. were weaners or slips, 29 per cent. stores or porker-size pigs, and only 3 per cent. beyond the porker stage.

Total Losses

Table 6 summarises the position covering all complete returns and shows the total losses as a percentage of the total pigs born by district. It also shows the over-all percentage loss based on total pigs born, and the post-weaning losses as a percentage of the pigs weaned.

Main Problem

This preliminary report on data covering nearly 25,000 piglets born will be followed by a final report after completion of the survey, which is being continued during the present dairying season. No attempt will be made to draw conclusions at present, but it is worth noting that to date the survey confirms previous figures of losses recorded on more restricted data and indicates that the main problem is the reduction of losses at or immediately after farrowing. There were large differences in percentage losses at this stage on different farms and, if accurate information on management practices, accommodation, and other factors having some bearing on this matter is collected in the course of the present survey, it is hoped that it will be possible to give some lead to research workers as to problems to be tackled and theories or practices to be tested.

It is also intended in the current survey to collect more information on how long sows are retained for breeding, particulars regarding their culling and replacement, and more information on post-weaning losses, particularly as between home-bred and bought-in pigs.

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GARDENING with SHRUBS

BUSY people who believe they have no time for gardening are not necessarily correct in that belief. A garden comprised almost entirely of shrubs and small trees is often more attractive than one studded with beds of roses, annuals, and perennials. In this month's article for the flower gardener C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, discusses gardening with shrubs.

THE situation of a shrub garden is of little importance, for shrubs may be divided into many groups of species which will thrive under almost any conditions known in New Zealand. In a few instances it will be necessary to provide some form of shelter from salt-laden winds, such as are experienced on some parts of the west coast of the North Island. Such shelter is easily provided by species of trees which will tolerate salt conditions, the notable example being *Pinus radiata.* Though the choice of a site is not important, it is of the greatest importance to grow only species and varieties which are known to be suitable to that site.

Soil

In shrub gardening the basic soil invariably has to remain because usually large areas of garden are involved. However, this cannot be considered a limiting factor. There are shrubs suited to all soil types, and the most important point is to choose those which tolerate the prevailing soil conditions. A soil which is neutral or slightly acid will grow satisfactorily almost all popular ornamental shrubs, though certain groups of shrubs, such as the ericas and rhododendrons, are more exacting, preferring acid conditions and not normally being tolerant of a high percentage of basic salts in soils.

However, for good results a reasonable degree of fertility must be maintained, which can be done only by regular cultivation. Extremely heavy soils can be improved by the addition of sharp sand or well-rotted manures. Dressings of lime do much to increase the ease of working heavy clay soils.

Beds, Borders, and Informal Plantings

Though the informal layout is infinitely better than beds and borders in a shrub garden, in some cases, because of the size of the garden, beds and borders cannot be avoided. In the larger type of country garden, beds and borders should never be necessary.

Beds should be avoided wherever possible, and in the very few places where this is not possible the species grown in them should be dwarf ones, never exceeding 4ft. in height.

Borders are rather simpler to deal with in that they may be used for a variety of purposes, such as for plantings alongside driveways and paths, to take the place of live hedges along boundaries, or to shut off in a pleasant way parts of the garden which are better not left open. A shrub garden bordering a driveway as in the illustration above, makes the entrance attractive all the year round.

Informal plantings, once matured, are usually the source of the greatest satisfaction to the gardener who planned and planted them. Their value lies in their permanence, ease of working, and beauty.

Preparations for Planting

It is not, never has been, and never will be good practice to plant shrubs or trees in a small hole dug in the midst of uncultivated soil.

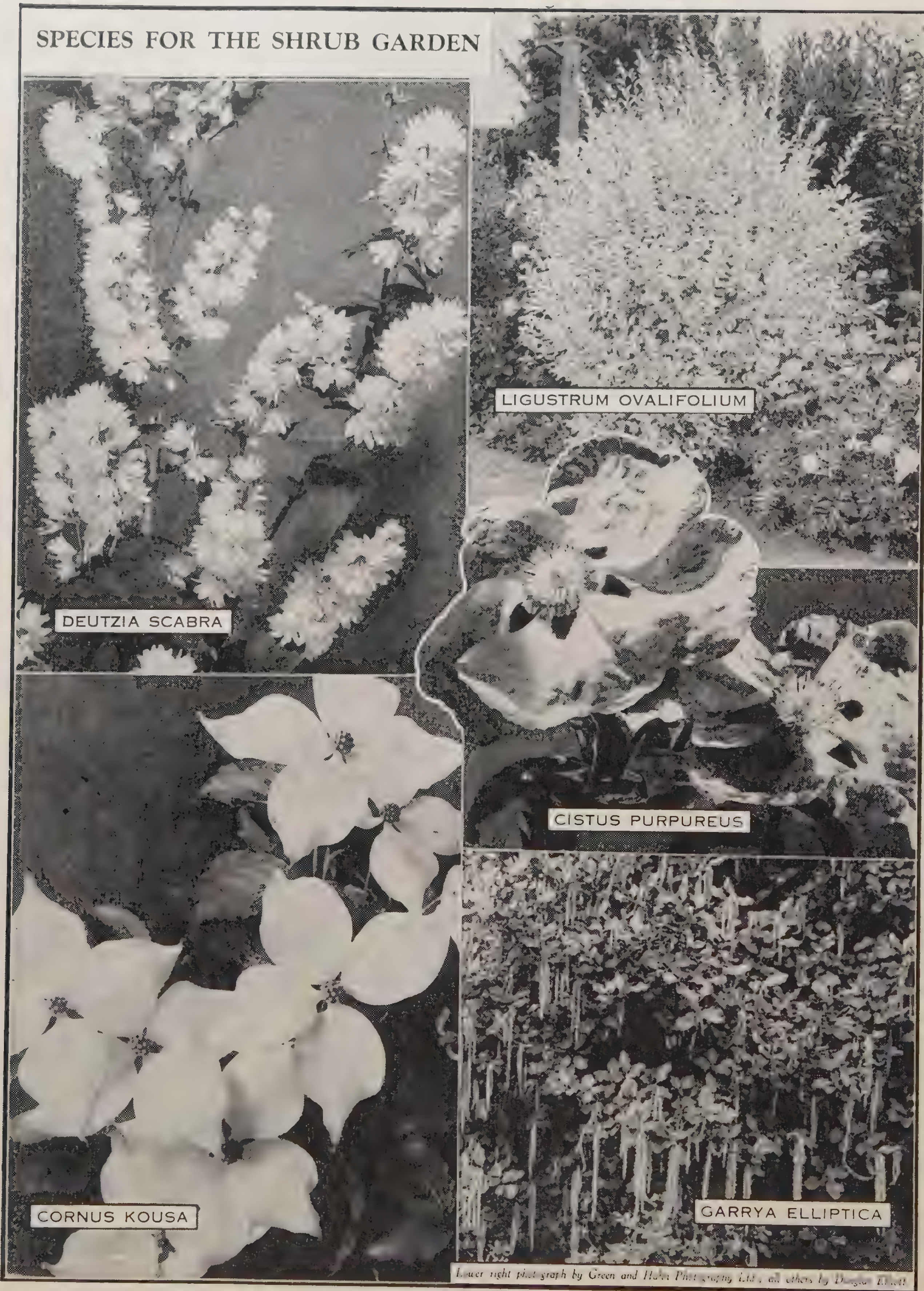
This is known as basin planting, a hole being simply scooped out in the middle of an area of grass or weeds, a shrub or tree placed in the hole, and the soil shovelled back. The result is that all surplus water from heavy showers drains directly into the basin, which acts as an efficient sump. Few shrubs or trees tolerate the excessively boggy conditions which result, and many hundreds of trees planted in streets, parks, and gardens have met an untimely death because of this practice.

Manure and Lime

When the soil is being prepared the whole area must be cultivated so that standard conditions are provided in all parts, thus avoiding accumulations of water as well as providing better conditions for rooting in the early stages of growth. During this period of preparation dressings of manures and well-rotted compost should be applied to the lighter soils, and sand, well-rotted manures, or other lightening agents to the heavier soils.

Heading photograph by Elmar Studios.

SPECIES FOR THE SHRUB GARDEN


DEUTZIA SCABRA
LIGUSTRUM OVALIFOLIUM
CISTUS PURPUREUS
CORNUS KOUSA
GARRYA ELLIPTICA

Lower right photograph by Green and Hahn Photography Ltd.; all others by Douglas Elliott

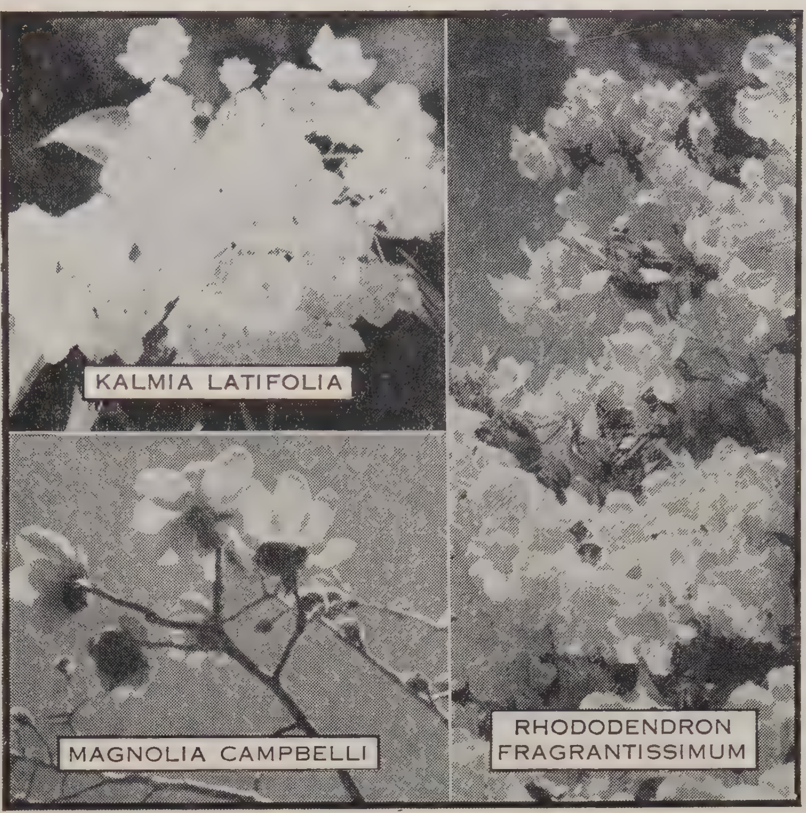
Should the soil be extremely acid, fairly heavy dressings of lime in the form of ground limestone are advisable. Heavy soils require larger dressings than lighter soils of the same degree of acidity, but following is an indication of the applications which can be given: Loams, 1½ to 2 tons per acre; clay loam, up to 2½ tons per acre; sandy loams, ½ to 1 ton per acre. Before these dressings are applied some idea of the true degree of soil acidity should be obtained.

Drainage

As in most types of gardening, drainage is of great importance. Few trees or shrubs will tolerate excessive moisture about the roots. The usual methods of soil drainage are now widely known and understood, so suffice it to say that if the natural drainage is not good, it should be improved until it is good.

Planting

In no circumstances should planting be haphazard. The ultimate size of every shrub or tree to be planted should be considered and adequate space allowed for full development. Planting shrubs and trees closer together than their ultimate size will require with the object of thinning them out later is most unwise, because by the time the specimens are large enough to be thinned the gardener usually has forgotten his original intentions and the result is a mass of tangled, overcrowded growth without a desirable specimen in it. Plants may take some years to reach their ultimate size, but the appearance of the area can be enhanced greatly by maintaining it as a rough lawn.



[*Right and lower left photos by Douglas Elliott.*

Three of the species which grow well in lime-free soils.

When the spacings for the plants have been decided on, the position of each specimen should be marked with a peg. The hole should be dug deep enough to accommodate the roots without their being bent or cramped and to allow the plant to be buried to the old nursery mark on the stem when the hole has been filled. It should be wide enough to allow the roots to be fully outspread.

At the time of planting, any damaged or broken roots should be cut away cleanly with sharp secateurs. Should the specimen being planted require staking, it is better to place the stake in the centre of the hole before planting than to drive it into the soil after planting and risk damaging the roots.

After the plants have been set out the soil should be firmed thoroughly by tramping, and after each frost during the season of planting the specimens should be checked to ensure that the frost has not "heaved" the plants from the soil; if there has been any "heaving", the soil should again be tramped firmly. If this is not done, the roots may be damaged while the soil is cracking and the entry of frost through the loosened soil will increase the extent of the damage.

Some pruning at the time of planting is often necessary to improve the shapes of shrubs and trees, but this cannot be described in detail as the method differs for almost every species.

The lists on this page contain species and varieties of ornamental shrubs and trees divided into groups suited to various sites and soils. They are far from complete and are intended merely as a guide.

Plants Suitable for Growing in a Shrub Garden

Species which Thrive in Shade

Aucuba japonica
Berberis darwini
Berberis stenophylla
Cornus alba
Gaultheria shallon
Mahonia aquifolium
Olearia haasti
Philadelphus species
Prunus lusitanica
Rhododendron ponticum
Ruscus aculeatus
Skimmia japonica

Species which Thrive beneath Trees

Aucuba japonica
Buxus sempervirens
Cotoneaster simonsi
Hedera helix
Hypericum calycinum
Ligustrum species
Mahonia aquifolium
Rhododendron ponticum
Ruscus aculeatus
Sambucus nigra
Skimmia japonica
Viburnum tinus

Species which Thrive in Windy Places

Aucuba japonica
Berberis vulgaris
Crataegus
Escallonia
Euonymus
Griselinia
Prunus spinosa
Rosmarinus
Ruscus aculeatus
Spartium junceum
Tamarix

Species for Seaside Planting

Berberis
Buddleia globosa
Buddleia variabilis magnifica
Cornus sanguinea
Cotoneaster
Garrya elliptica
Olearia haasti
Rosa
Rosmarinus
Symphoricarpus
Syringa
Tamarix

Species which Thrive in Chalky Soils

Buddleia variabilis
Cistus
Cotoneaster
Crataegus
Cydonia japonica
Forsythia
Jasminum
Philadelphus
Prunus
Spartium junceum
Syringa
Veronica

Species which Thrive in Lime-free Soils

Andromeda
Daboecia
Daphne
Erica
Gaultheria
Kalmia
Leucothoe
Magnolia
Pernettya
Pieris
Rhododendron

Species which Thrive in Stony or Sandy Soils

Berberis
Cistus
Crataegus
Cotoneaster microphylla
Cytisus
Genista
Lavandula
Prunus amygdalus
Prunus cerasus
Rosa spinosissima
Rosmarinus
Spartium junceum

Species which Thrive in Clay Soils

Buddleia variabilis
Cornus
Cotoneaster
Deutzia
Diervilla
Forsythia
Lonicera
Philadelphus
Pyracantha
Pyrus
Senecio
Spiraea

Species which Thrive in Moist Places

Andromeda polifolia
Arundinaria (bamboo)
Crataegus
Myrica gale
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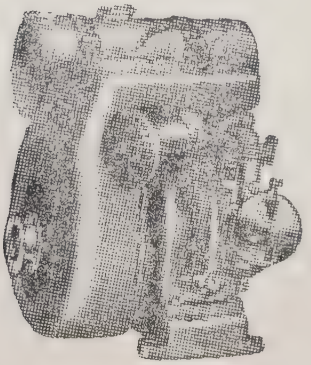

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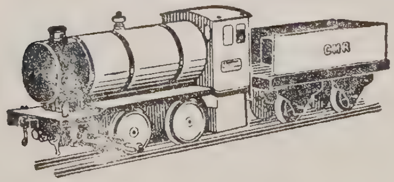

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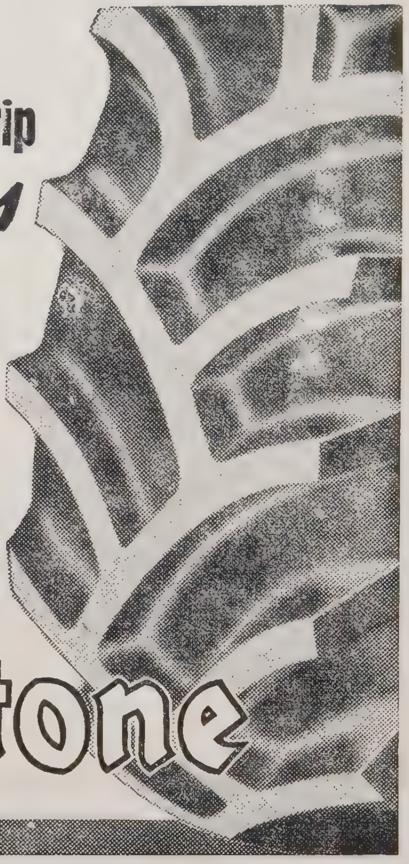

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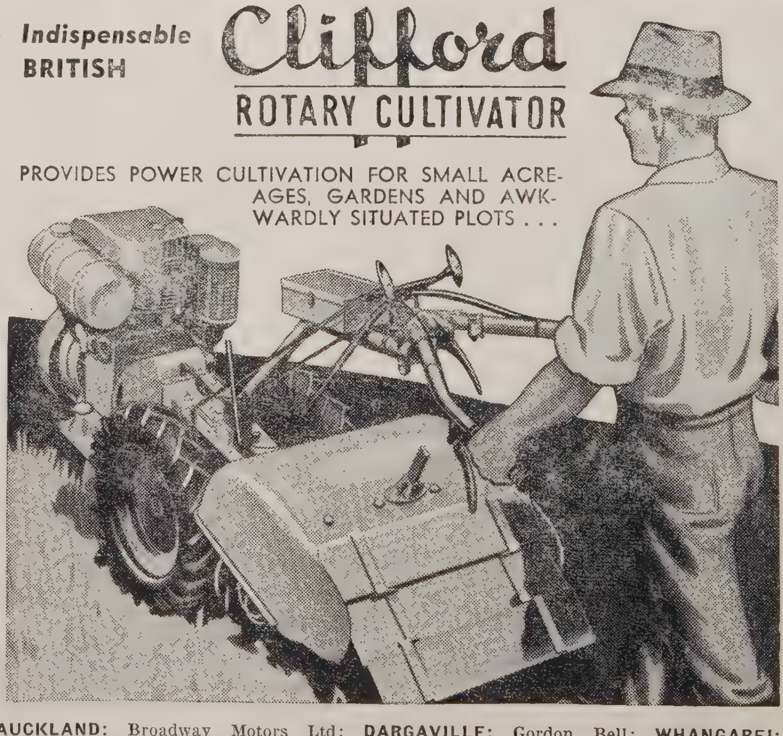

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Primroses or polyanthus potted up into bowls are very useful for house decoration.

Bedding plants for spring flowering can be planted until the end of June in mild districts if the soil is not too wet for planting. Double daisies, primroses, polyanthus, violas, forget-me-nots, wallflowers, gaillardias, and sweet williams are all useful. The last four should all be raised each year from seed sown in summer, and violas are best grown from cuttings taken in late summer. To increase double daisies and polyanthus the previous year's plants should be dug up, pulled apart, and each piece ("crown") with leaves and roots planted separately, with the junction of roots and leaves slightly below the surface.

Chrysanthemums of the late, large-flowered varieties grown in pots for exhibition need a very long growing season. When the flowers finally fade the stems should be cut down nearly to the ground, any long suckers cut back to the soil level, and the pots stood in a light airy place to await the growth of new suckers from below the ground. These make the best cuttings and should be removed for rooting as they appear.

Fuchsias make good pot plants for the house. They are best raised afresh each year from cuttings, but if this year's pot fuchsias are to be kept to flower again next year, they should be dried off gradually until the leaves drop and then stood in a cool, frost-free place for their annual rest before being repotted and started into growth again in late winter.

Hydrangea flowers are most unusual in that their colour depends more on the nature of the soil than on the character of the variety. A variety that bears bright blue flowers in one garden may have pink ones in another, and even flowers of a metallic green in a third place. Varieties with naturally white flowers will not take on any other colour whatever treatment they may be given, but the colour of other varieties can be changed more or less at will by soil management. For pink colours the soil should be dressed with lime each winter at the rate of 4oz. to the square yard, or more if experience of the soil shows that this is not sufficient. Blue colours can be obtained by dressing the soil in winter with alum or aluminium sulphate, scattered for a few feet around each bush at the rate of up to 1lb. or even more a square yard. Only experience can show how much aluminium sulphate is needed for satisfactory "blueing" in any soil, but if the flowers are not truly blue after a winter dressing a further dose of aluminium sulphate dissolved in water can be applied in early summer. Though much cheaper than the aluminium salts, sulphate of iron does not usually produce such satisfactory blue colours, but is more likely to make the flowers a curious, metallic green.

[*Green and Hahn Photography Ltd. photo.*

The blooms of hydrangeas depend for their colour as much on soil management as on variety.

Lawns can be kept healthy only by being fed regularly. The best dressing consists of 3 parts of sulphate of ammonia, 1 part of superphosphate, and 1 part of sulphate of iron applied evenly at the rate of 1oz. a square yard. This should be applied 4 times a year, one of the dressings being due in June unless the ground is very wet or the district is a very cold inland one, in which circumstances it is probably safest to omit the midwinter dressing.

Planting of new shrubs and trees can be done if the ground is not too wet, especially if the soil is light and sandy, but planting if the soil is too wet is folly. If plants come to hand from the nursery when the soil is in this condition, they should be "heeled in" at once to await conditions more suitable for planting.

"Pricking over" is the term which gardeners use for shallow cultivation with a fork. Deep cultivation is very beneficial to the soil, but digging deeply between such plants as shrubs, herbaceous plants, and roses is impracticable as it causes great damage to the roots of these plants, which would be seriously weakened. On the other hand, soil which is continually cultivated by hoeing only soon becomes too fine, tends to lose its crumby structure, and cakes badly after rain. At least once a year the ground between shrubs, herbaceous plants, roses, and other permanent plants should be pricked over with a fork. The handle should be kept low so that the tines do not go deeply into the soil, which should be left as lumpy as possible, no attempt being made to break the lumps down. At the same time any fallen leaves on the surface should be buried to rot and return humus to the soil.

Primroses or polyanthus will flower well in the house if lifted in midwinter and potted up into bowls. Each plant should be lifted carefully, have the soil washed from its roots, and be planted in a bowl with moss or good potting compost packed firmly between the roots. The bowl should be stood in a sunny position and the plant watered only when the compost or moss feels dry to the touch, as too much watering causes the roots to die and rot. The plants grow and flower for weeks if potted in compost, but plants set out in moss show signs of starvation after a week or two and should then be either replaced by new ones or fed with complete fertiliser.

[Photo News Ltd. photo.

If a good display of gladioli is to be ensured, thrips (inset) must be eliminated from the corms before they are planted.

Seeds of summer bedding plants may be sown in boxes under glass in the mildest northern districts to provide a supply of plants for very early planting. Elsewhere it is still much too early to sow seeds, even under glass, as plants produced too early simply become starved in their boxes before they can be planted out.

Stones set in path edges, retaining walls, and rockeries should be made quite firm by ramming the soil thoroughly between, under, and around each stone as it is put in position. After each stone has been laid, and before another is added to a wall or rockery, it should be tested to make sure that it is perfectly rigid. However, even well-laid stones occasionally become loosened, especially after a dry season when the soil shrinks away from contact with the faces of the stones. A loose stone is a menace to safety, as it can result in a nasty fall if it is stepped on, and stonework should be examined carefully each winter. Loose stones should be taken out and relaid, making sure that the soil is replaced a little at a time and very firmly rammed as the work proceeds.

Sweet peas succeed best in a site which has been specially prepared for them. The sooner this work can be put in hand during the winter the better, provided the soil is not too wet, as it is an advantage to leave the site for some weeks to settle before the sweet peas are planted. Seed can still be sown in pots or boxes in a cold frame.

Pests and Diseases

Thrips on gladiolus corms: Gladiolus corms should be examined periodically and the skins removed from a few to see whether they are still in good condition. Brown, sticky staining of the flesh of the corm is usually a sign that the corms are infested with thrips, which are small, active insects with slender elongated bodies up to 1/10in. long when fully grown and ranging in colour from yellow to brown or black.

Reports indicate that D.D.T. dust is effective in killing thrips in stored corms. A dust containing 5 per cent. of D.D.T. should be used at the rate of 1oz. of powder to each bushel of corms, which are then well shaken up in a bag to mix the powder thoroughly among them.

It is important to control thrips on gladiolus corms and not to plant the corms out while they are still infested with the insects, as that usually results in a heavy infestation on the new crops, which may be ruined if the season happens to be a dry one favourable to the rapid building up of a big population of thrips.

Escallonia hedges should be looked over for dead bushes or branches, which should be cut out at once and burnt. They have probably been killed by silver blight fungus, which is spread by spores produced on brownish-purple growths that appear only on dead wood. Therefore all dead branches or bushes should be cut out and burnt before these growths have time to form.

Ribes sanguineum

MORE commonly known as the flowering currant, *Ribes sanguineum* is a deciduous species of a large genus of spring-flowering shrubs. It grows 6 to 8ft. high, has attractive, tooth-edged, five-lobed foliage, and bears rosy, pendulous flowers to herald the spring.

The flowering currant can well be classed in the front rank of spring-flowering shrubs. It is particularly useful because it will grow in most situations and soils, but it thrives in sunny positions and is said to be useful for growing near the sea. It gives a pleasing perfume, particularly on dewy mornings and during showery weather. Pruning consists of thinning out the growth well and cutting away old and weak wood after the shrub has flowered.

R. sanguineum can be propagated so readily from cuttings that other methods such as layering are seldom used. Cuttings 9 to 12in. long of mature young growth should be taken in April or May and planted firmly in a sheltered outside border.

—*H. P. THOMAS, Vegetable Instructor,*
Department of Agriculture, Wanganui

Photograph by Broadway Studios.

ITALIAN QUILTING

QUILTING is a decorative way of stitching together two or more layers of material. Long before it developed into an art it was used to make warm clothing and bed covers. Though history does not record its origin, specimens of quilting have been found in China, India, Persia, and Europe; Babylonian and Egyptian sculpture reveal garments suggesting primitive quilting. The name Italian quilting has crept into popular use, though the art is by no means peculiar to Italy, for many nations make use of the technique for bed covers, dressing gowns, and jackets, for babies' coats and bonnets, and for hot-water bottle covers and tea cosies. Choice of materials, working methods, and designs are discussed in this article by Helen Paine, Rural Sociologist, Department of Agriculture, Wellington.

ITALIAN quilting is a decorative stitching used to embroider designs on a variety of fabrics. Many fascinating old designs could be revived for this form of quilting, and there is scope for new designs to be created, too, for a wide range of materials in many different colours is available for this work. As the quilting is an applied design and not part of the structure of the article, the motifs and patterns of this form of embroidery do not have to cover the material, but may be placed where they show to their best advantage. Italian quilting is therefore less laborious than the traditional forms of English quilting, in which the object is to hold three layers of material firmly in position and the design must be planned to cover the whole surface of the article. Another advantage that Italian quilting holds over the more ambitious forms is that the stitches can be worked while the material is held in the hand and without making use of a frame.

For the embroidery work of Italian quilting only two layers of material are necessary, though a lining must be added afterward. The design is outlined with a double row of stitching through both layers of material, forming a narrow channel into which cord or thick wool is threaded from the back, throwing the outline into relief on the front. This form of quilting is primarily decorative, but if it is intended to supply warmth as well, the addition of lining or padding to the finished article is quite simple.

Design is all-important in any form of quilting, as the stitching is quite easy. Floral motifs, birds and flowers, and geometric and conventionalised designs are all suitable, but the pattern chosen must always have a double outline. Quite a number of simple designs can be adapted by doubling the outline, and many designs already double in outline, such as those for "cut work" or "applique", are particularly suitable. Monograms are usually satisfactory motifs and are particularly easy for the beginner to copy.

Choice of Material

Many fabrics can be used for quilting and a great variety of colours is suitable. Silks and satins are favoured for rich effects, as the lustre of these materials shows up the design by the play of light and shade on the surface; other semi-lustrous materials such as crepe de Chine and pure silk can also be used successfully. Fine linens, chintz, and some cotton materials are useful for articles which need more durable qualities than satins provide. For lingerie, however, satin is the ideal material to be quilted.

Other materials used in the process of quilting are butter muslin, which is required for the under layer, and soft cotton cord or thick wool, which is used for the padding. If the article being made is required for warmth, a wadding interlining can be added separately.

Almost any colour is suitable for a quilted fabric, but the lighter shades are perhaps the most attractive, because they respond better to the play of shadows on the undulating material. Lovely effects can be gained by using coloured wools for padding out the design; with a near-transparent surface material the effect of soft colours shows up on the front. This is known as "shadow quilting" and will be understood better when the working methods of the ordinary quilting process have been described.

The materials which should be assembled before work is started are a suitable fabric for quilting, the amount being worked out from the pattern, the same quantity of butter muslin, thick wool, or cotton cord, a blunt needle with a large eye through which the wool can be threaded, and silk or mercerised thread matching the material.

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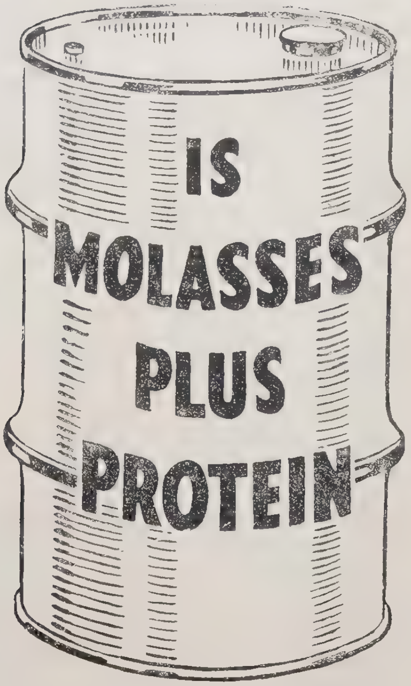
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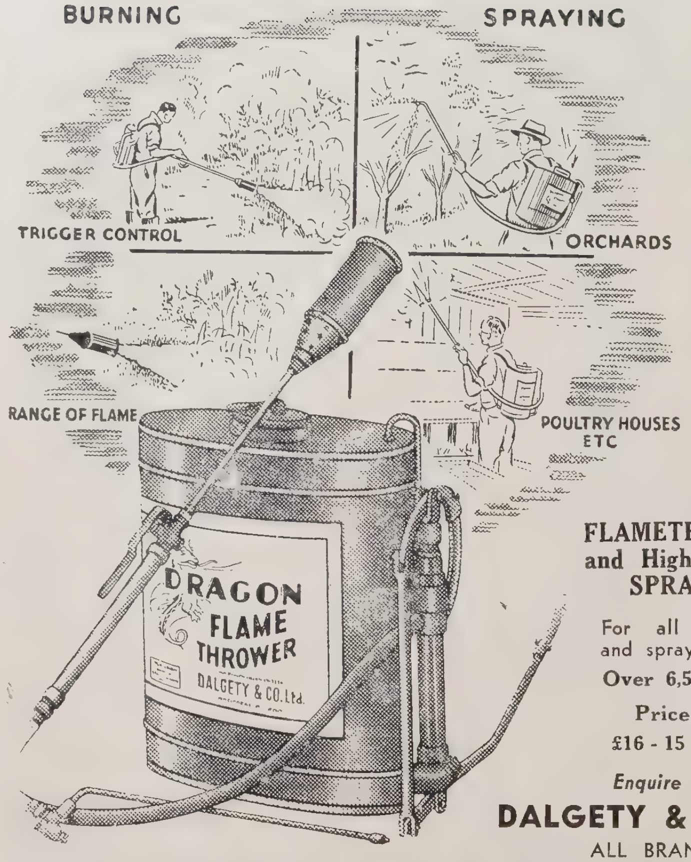
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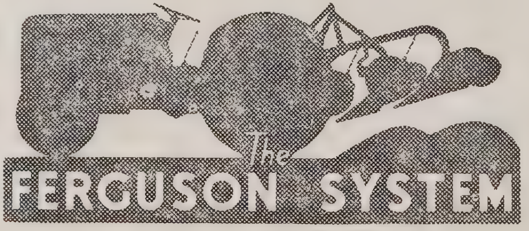
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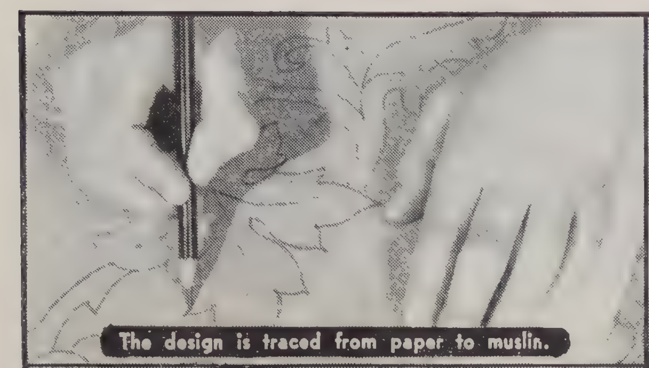
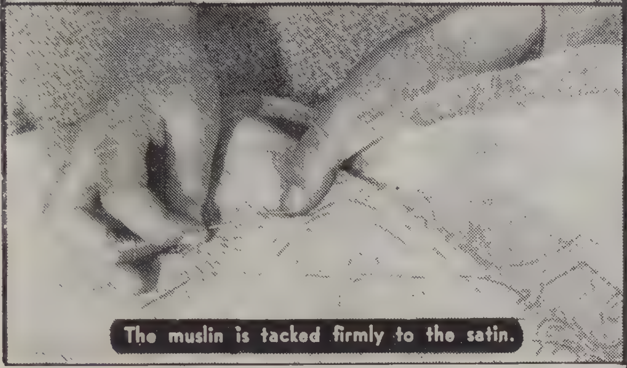
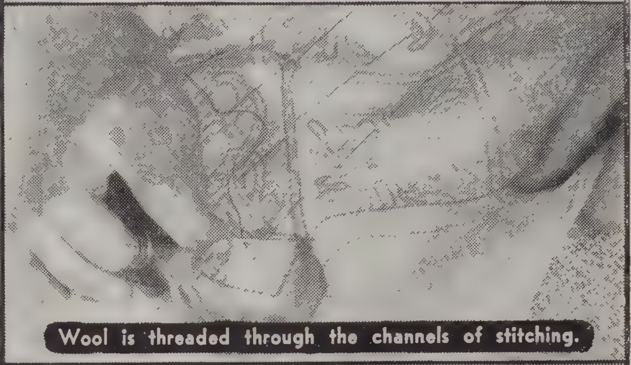
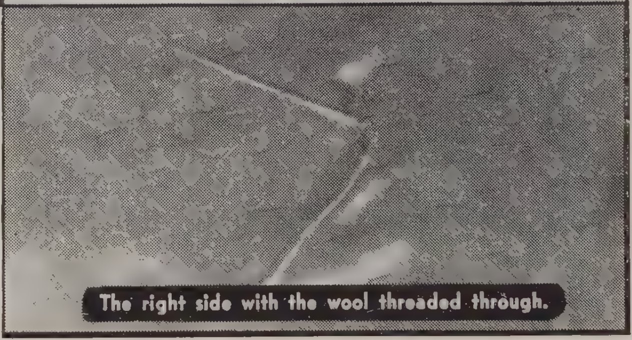

The design is traced from paper to muslin.

The design as it appears after being traced.


The muslin is tacked firmly to the satin.


Wool is threaded through the channels of stitching.


The right side with the wool threaded through.

The Design

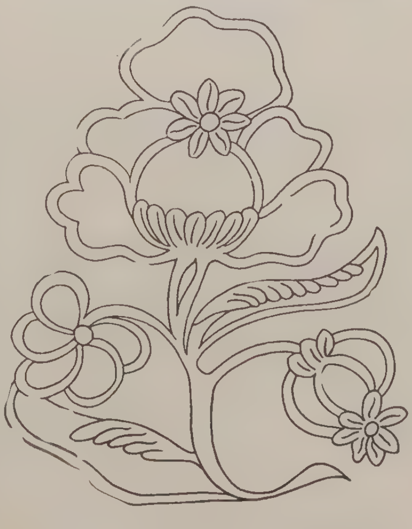
When choosing a design or working out a pattern for a quilted fabric it is wise to cut a paper pattern of the article to be made and fit the design into that area. For small items, such as a hot-water bottle cover, a tea cosy, or a handkerchief sachet, one motif will suffice for the design, but for more ambitious articles a repetition of the motif is necessary. Around the bottom of a housecoat or even around the sleeves of a bedjacket this repetition of a design is particularly attractive.

As Italian quilting is purely decorative, it is not essential to cover the whole of the available surface with a pattern; in fact, with careful placing the chosen design can be quite small and still very attractive, or it can be applied as a border design.

Working Methods

The fabric to be quilted and the muslin backing are first cut to the desired shape, and the design is then drawn on to the muslin material. If the design is being copied, it is quite simple to place the muslin over the design and trace the lines through the material or to trace the design on to the muslin by using carbon paper. If a transfer pattern is being used, it can be ironed straight on to the muslin. The muslin and the surface material are then tacked firmly together with the traced pattern uppermost; the extent of the tacking determines the quality of the workmanship, so tacking carefully is worth while. The work is then ready for quilting.

Working on the patterned side, trace round the outlines of the design in small running stitches, which must go through both layers of material and be very close together. Small, neat stitches are therefore essential, and they must cover the double outlines of the design. Then remove all the tacking stitches.


The type of design suitable for carrying out in Italian quilting.

The next step is to pad the design, and this is also done from the under side of the materials. Use a blunt needle with a large eye and thread it with wool or cotton cord of sufficient thickness to fill the space between the double outline of the design. The padding must be thick enough to make the design stand out in sharp relief on the front, for if it is too thin, the effect is lost. The needle is slipped between the two layers of material—the muslin and the surface material—and threaded between the double outline all around the pattern. At any pronounced curve or angle bring the needle out and insert it again through the same hole, leaving the cord loose in a small loop; this prevents the padding from pulling at the corners and puckering the surface. To fill a wide space such as the centre of a flower several stitches are made in and out until the space is well padded. These stitches do not show on the right side, as all the work is done from the back of the materials.

Shadow Quilting

When coloured wools are used for padding the design the motifs must be filled out with bright blues, reds, yellows, and greens. These brilliant colours show through a fine surface material as the palest pastel shades and through a thicker satin material as the merest suggestion of a soft colour.

Making up a Quilted Article

When the whole of the outline of the design has been filled in with padding the quilting is finished. The article has only to be sewn up and lined to be complete. This process varies for different articles.

Using an ironing board or table that is well padded, iron the quilted material on the wrong side so that the design is brought out in marked relief on the front. All Italian quilting must be lined to cover the muslin backing, so the next step is to cut a lining from the original pattern or the shape of the quilted material. The lining should be of a lightweight material similar to the outer fabric; it can be exactly the same. Variations for the lining could be achieved with contrasting colours or a different shade of the same colour.

The next step is to machine the seams of the article and the seams of the lining; then press them all open carefully. If warmth is required for a dressing gown, bedjacket, or cot cover, an interlining must be stitched so that it will lie between the muslin and the lining in the finished article. Materials suitable for this purpose include cottonwool, wadding, scoured and carded sheep's or lamb's wool, flannel domette, and blanket materials. The wadding is stitched to the lining before it is joined to the outer material. Should the area covered by the wadding be large, it is wise to secure the lining and wadding in position by working eyelet holes.

When the lining, with or without the interlining, is completed, it must be carefully pinned to the outer material so that all the seams coincide. The seams attaching the lining to the outer material can be sewn by machine or by hand, though the last few must always be sewn by hand. A small slip stitch looks neatest and can also be used to secure some of the inner seams of the lining and the outer layer. For instance, the shoulder seams of any garment such as a housecoat or bedjacket must be secured to the lining if it is to stay in position.

Uses for Quilted Fabrics

On bedjackets, housecoats, and similar garments a quilted design looks most attractive; nor does it have to be very ambitious to be effective. A wide band of embroidery round the hem and sleeves of a housecoat or a simple motif down the front panels of any of these garments looks attractive.

For a luxury gift a quilted hot-water bottle cover or a sponge bag does not take too long to make. Quilt one well-designed motif on to the front and leave the back plain. A hot-water bottle cover should have an interlining, but a sponge bag could be lined with plastic. A pretty quilted tea cosy could be made from a fine linen material that would stand years of laundering if the interlining were detachable. A hand-quilted cover for a baby's pram is worth the extra effort and probably would be much admired. A quilted bedspread can be very luxurious, but it is not wise to attempt anything so ambitious until the technique of quilting has been mastered. Then suggestions for smaller or larger articles will come to mind too quickly for the hands to keep pace with them.

India's Urgent Need of Relief from Famine

BECAUSE of a grave shortage of grain India is now facing the threat of a disastrous famine. Deaths from starvation have already been reported in one state, which has had to introduce strict rationing of food. Relief in this crisis must come from other countries and on the measure of it depends millions of lives. To enable its work among the poverty-stricken and hungry people of India to be extended and the flow of relief supplies to be increased the New Zealand Council of Organisations for Relief Service Overseas (CORSO) is now appealing for funds and gifts.

An open-air school at an Indian refugee camp which accommodates 15,000 displaced persons.

MUCH energy and money which might have been expended on the economic reconstruction of India has had to be spent on the rehabilitation of people who came from Pakistan after the division of India. About 8,000,000 Moslems migrated to Pakistan and about the same number of Hindus moved to India. Even where peasant replaced peasant a smooth continuation of food production was not possible, because the migrant peasant had to learn different farming methods owing to the great variation in conditions in India. A further complication was that the migration between the two countries resulted from rioting and bloodshed and was therefore neither planned nor orderly.

Commendable Effort

Both by Government action and private plan India has made a commendable effort to solve her food problem, but she has had to deal with obstacles of such magnitude that solution by herself has become practically impossible. Devastating floods in the Punjab in 1947 and last year, earthquakes in Assam last year, drought, locust plagues, and delays to reconstruction through difficulty of obtaining capital and equipment have made the problem almost insuperable.

Immediate relief from abroad is imperative, but it must be supplemented by the planning and initiating of long-term reconstruction. Food by itself is not enough; in addition to making the starving fit to work, they must be trained to work efficiently so that they have the opportunity to become self-supporting.

CORSO began sending food and clothing to India in 1949 and shipments of milk powder, vitamin capsules, and medical supplies are now being sent for distribution to refugees. Support is also given to organisations engaged in constructive relief work.

One of the most important services rendered by CORSO is assisting to maintain a New Zealander, Joseph G. Short, at the Allahabad Agricultural Institute. As head of the extension department of the institute Mr. Short is introducing new techniques to the village farmer which will enable him not only to wrest a better livelihood from the soil but to increase his production of foodstuffs. The value of this work is not confined to Allahabad, because information about new developments evolved through the work of the institute is spread to other districts of India.

Other organisations which CORSO is assisting, or proposing to assist if sufficient funds can be obtained, are also engaged in agriculture and particularly the resettlement of refugees on vacant land. One of these, the new refugee colony being established by the All-India Women's Conference in Bengal, is playing an important part in helping to produce food by the growing of vegetable crops. Other societies are furthering agricultural education and are training women and children to utilise the land to greater advantage.

Through the provisions of the Colombo Plan the New Zealand Government has undertaken to give aid to south-east Asian countries, of which India is the largest, but apart from these national obligations much can be done by private endeavour. CORSO is the collecting and distributing agency for such voluntary effort and through CORSO New Zealanders can contribute to the strengthening of international good will and to the alleviation of suffering among the less fortunate people of India.

By the adoption of new methods and the mechanisation of farming India can increase her own production of foodstuffs.

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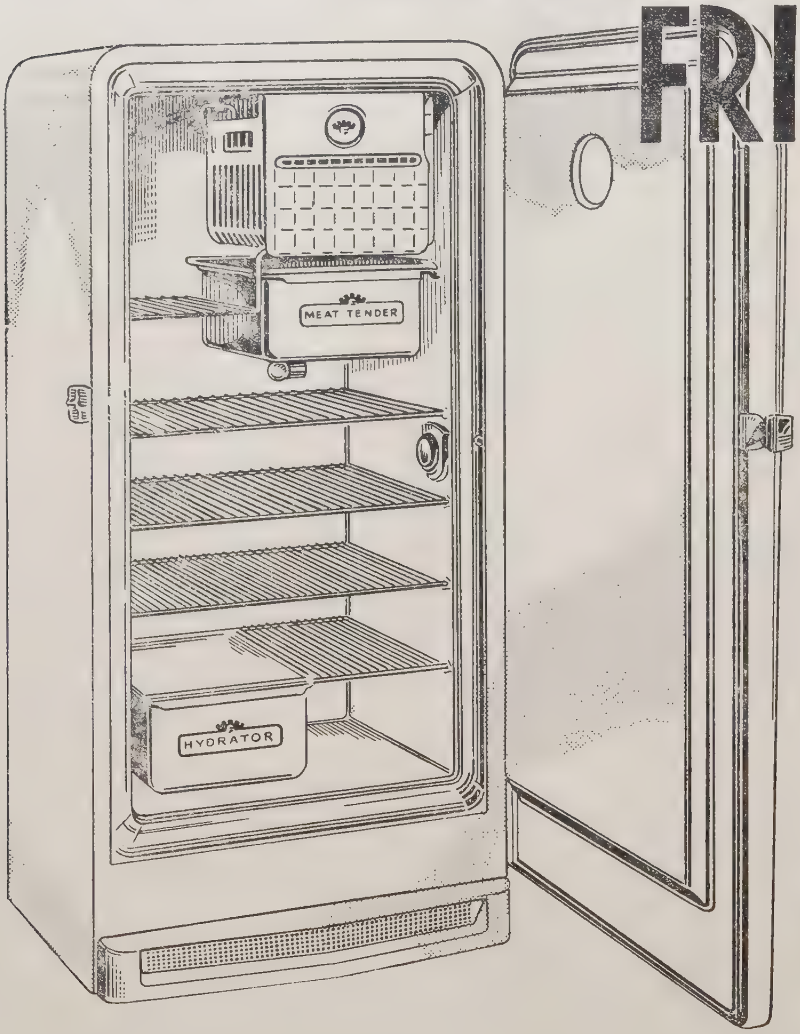

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Sugar Bag Rugs Are Easily Made

By NELL MACPHERSON, Rural Sociologist,
Department of Agriculture, Auckland

SUGAR BAGS have many uses from peg bags and oven cloths to kitchen hold-alls and mats. It is as an easily made rug or mat that the humble sugar bag is a most useful and cheap article. There are several ways of making sugar bag rugs, using the sugar bag as a backing for either wool or material, first for a hooked wool rug, secondly for a hooked rag rug, and thirdly for a stitched tufted rug.

IN some cases, however, the whole rug is made of sugar bag. Two rugs of this type will be discussed in this article. Sugar bags will withstand a lot of wear and as they are fairly easily dyed attractive colours, they will fit in with kitchen, bathroom, or even bedroom colour schemes.

1. Quilted Sugar Bag Mat

A quilted sugar bag mat is most suitable for a kitchen or passage. Two sugar bags are required and after the seams are opened the bags are boiled in soapy water for 10 minutes, rinsed twice, but not blued, and hung to dry.

When the bags are dry the edges should be straightened to the true grain and pinned together with the printing inside. The outside should now be stitched right round 1in. from the edge and the sugar bag stitched across in any quilting pattern in any colour. Ravel the edges to make a fringe and then leave the mat in the sun for an hour or two, as this fluffs up the fringe. Pieces of cotton material may be appliqued on to the mat in a pattern. For a child's room a nursery rhyme pattern is most attractive. Woollen material is not used because it cannot be boiled. A piece of padding placed between the two bags makes the mat thicker and warmer, but it is better to use a material which washes well. This mat is suitable for putting below a child's play-pen. It keeps the child warmer and as it is easily washed and boiled, it can be kept very clean.

2. Pile Rug

Five sugar bags will make two pile rug mats. Open the sugar bags and prepare them for sewing in the same way as for the quilted mat. Straighten the edges of the bags by pulling a thread and cutting off any crooked part. Take one bag and cut it into 1in. strips. This gives a pile ½in. deep. If a deeper pile is desired, cut wider strips. Now place the first strip on the edge of the other bag. Pin it so that the edge of the strip is just inside the edge of the bag. Sew it down the centre. Place the next strip so that the centre of it is not quite half the width of the strip away from the previous line of sewing. Stitch it down the centre. Continue in this way till the surface of the bag is completely covered. Finish off all the thread ends by tying or stitching them back.

Ravel each strip to within a thread of the line of sewing. Leave the mat in the sun to raise the pile. To make the mat firmer, either back it with a piece of cotton material or face the edges with cotton material.

The mat can then be dyed to suit any colour scheme. A "boiling dye" is the best type to use.

Pattern Dyeing

A pattern can be made by tightly binding the rug with string or cord before putting it in the dye bath. The bound part does not take up the dye, so that a two-colour effect is obtained. The mat should be left to dry thoroughly in the sun and the pile can be lifted by either shaking or brushing.

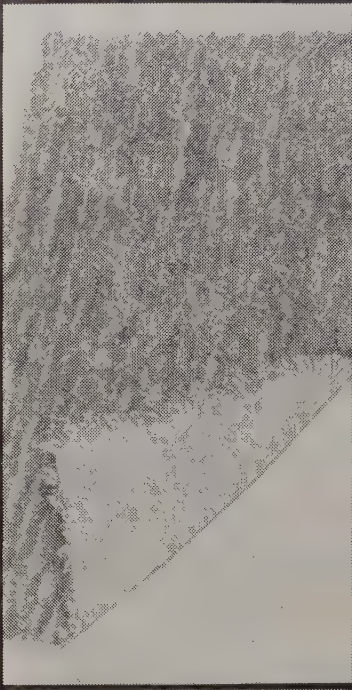
Circle Pattern

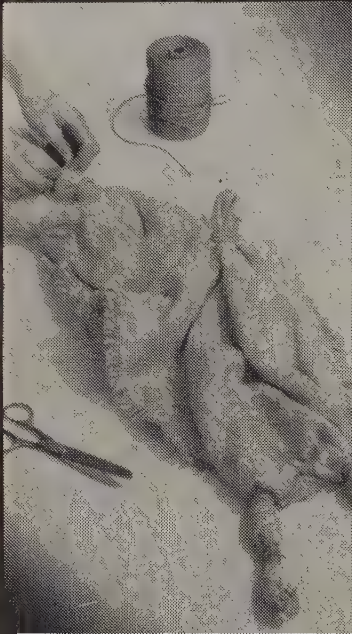
Bind the corners of the rug and the centre of the mat with string before dyeing the mat.

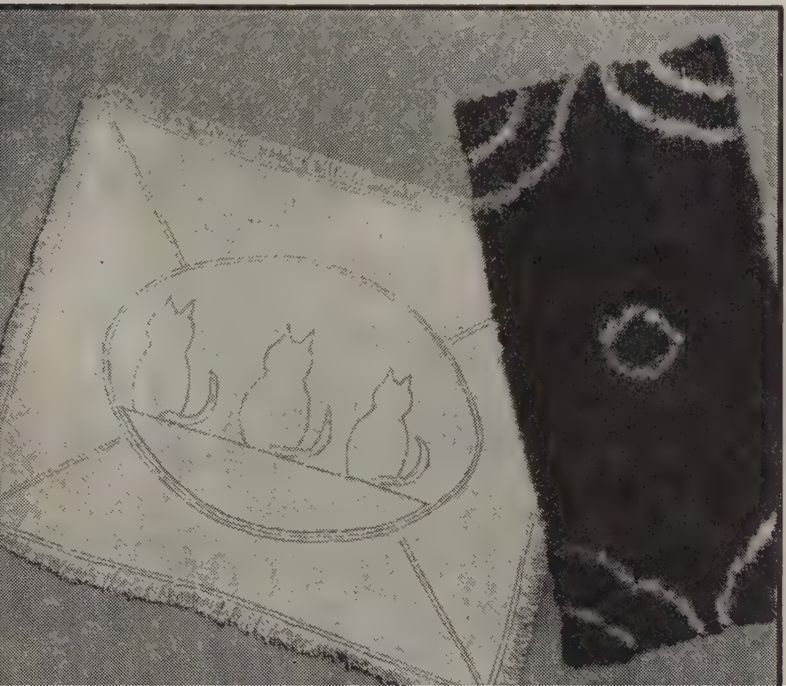
Striped Rug

The rug should be bound several times along its length. The width of the stripes depends on the width of the binding, so variations in the pattern are readily obtained.

This mat is splendid for bathroom use, as it absorbs moisture very readily, but it can be used in a bedroom or kitchen-living room equally well.







Upper right — Stitching on the first strip. Middle right—The mat ready for backing or dyeing. Lower right—The mat tied for pattern dyeing. Left—Completed sugar bag rugs.

Wool in the Empire's History

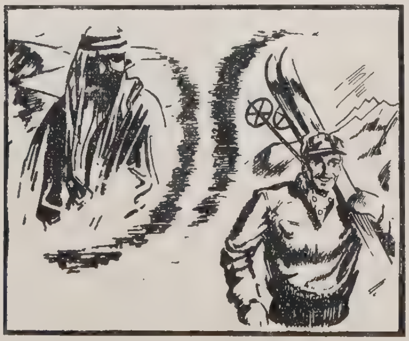
A NATURAL fibre, wool undoubtedly is one of the most ancient protections for man against the elements. Though many centuries elapsed, it was comparatively only a short interval in the human story before man discarded the skin of the sheep, with its woolly fleece, and learnt to make the fibre into a primitive overcoat. Ancient records show that the art of cloth making was practised nearly 4000 years ago, and wool cloth was among the earliest articles of barter.

IN seeking protection against heat and cold man naturally took to wool, for, being a pure animal fibre, it is ideally adapted to the body's needs. The porous texture of wool fabric, in fact, bears interesting comparison with the human skin with its millions of tiny pores through which it breathes and maintains an even temperature.

Versatile Material

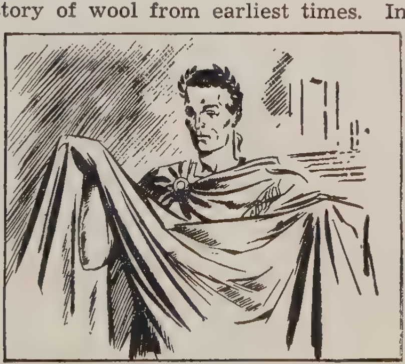
Wool is extraordinarily versatile. It can be spun, woven, knitted, dyed, and felted, producing an immense variety of cloths, from rugged tweeds to the most delicate fabrics imaginable. It supplies not only clothing but curtains, carpets, upholstery, and a wide range of felts.

Wool is worn in the heat of the tropics and in the intense cold of northern climes—worn all the year round in all parts of the world. Being impervious to climatic change, it is particularly suitable for countries which, like Britain, are renowned for the vagaries of their climates. It is not surprising that in Britain, where rain and sunshine, cold and heat, mingle so unexpectedly—a profusion of that "Morning Unaware" about which Browning wrote—wool should have many historic associations.

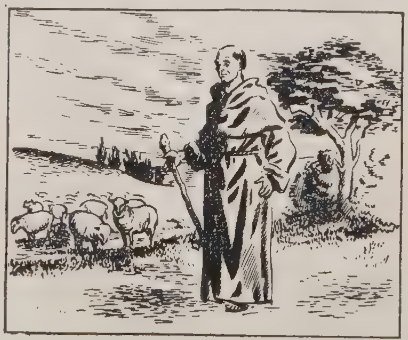


Part in Britain's History

Britain has been linked with the story of wool from earliest times. In Old Testament days Britons traded Cornish tin, raw wool, and dyes with the Phoenicians in exchange for the woollen homespun the Phoenicians bought from the women of Israel and dyed before selling. When Julius Caesar and his armies invaded Britain in 55 B.C. they found the people already skilled at dressing, spinning, and dyeing wool, a fact recorded by Pliny, the noted Roman historian. To encourage the Britons to continue the manufacture of woollen cloth they established a weaving factory at Winchester.



Sheep breeding flourished in Britain in the Middle Ages, mainly through the efforts of the monks who farmed the lands belonging to the abbeys and reclaimed large areas which had been laid waste by the Norman invaders. The Cistercian order, in particular, whose motto was a Latin phrase meaning "To work is to pray", proved as proficient at sheep farming as they were devout in the performance of their religious duties. Indeed, the wealth derived from Cistercian wool paid the major part of Richard Coeur de Lion's ransom when he was captured during the Crusades. In the 14th Century nearly 200 abbeys in England and Scotland were listed as supplying overseas markets with wool, and the Crown revenue from them financed the 100 Years' War against France.



So greatly did the British wool industry thrive through the centuries that in 1688 James II, who did much to further Britain's commercial interests abroad, proclaimed wool to be "the staple manufacture in this our kingdom." His successor, William III, was evidently of a similar opinion, as shown by his statement that "Wool is the greatest and most profitable commodity of this kingdom on which the value of the lands and the trade of the nation do chiefly depend."

Development in Dominions

The part played by sheep in the development of the British Dominions is a romance in itself. In 1789, 2 Merino rams and 4 ewes, the gift of the King of Spain to the Dutch Government (England's monarch, George III, having been honoured likewise 2 years previously), were introduced into South Africa by Colonel Gordon, the British official of the Dutch East India Company at Capetown. The Cape sheep being worthless for wool production, the Dutch farmers welcomed the chance to buy stock from his stud, and their subsequent need for wider pastures to accommodate the increasing flocks led to a considerable extension of the Colony's boundaries.

Some of Colonel Gordon's stud were also sold to an Australian buyer, and Captain John Macarthur's purchase of 3 of these Merino rams and 5 ewes provided the starting point of Australia's vast sheep industry. His first wool crop received such commendation from London experts that he set about procuring additional rams and a ewe from the Merino stud of King George III at Kew and decided to specialise in growing Merino wool. His venture was so successful that the Privy Council granted him 5000 acres of land near Sydney, and the descendants of that first Merino flock still graze in the fertile parkland which Captain Macarthur named after Lord Camden, the Secretary of State.

In 1834 John Bell Wright introduced into New Zealand 102 Merinos from Sydney, and in 1844, 400 more Merinos were shipped from Australia to the newly established colony. These, with the small flocks of English and Scottish sheep brought from Britain by pioneer settlers, founded the country's foremost primary industry.

Thus the Dominions, with their wealth of raw material, gradually became the major source of wool supply for the rapidly expanding wool manufacturing industry of Britain. Now three-quarters of world exports of fine clothing wool comes from the Dominions of Australia, South Africa, and New Zealand. In return, the Dominions buy British manufactured goods exported, so that wool is a fine builder of Empire trade. The excellence of British wool products is famed throughout the world, and in the great manufacturing centres such as Yorkshire, Scotland, and the west of England the remembered skill of old-time craftsmen still holds sway.

Research is continually enlarging wool's sphere of usefulness and, great as its past history has been, the beginning of an even greater era of expansion may well be at hand.

Cuts of Meat

By NELL MACPHERSON, Rural Sociologist, Department of Agriculture, Auckland

MEAT is just meat to some people, but the eating quality and the nutritive value vary according to the part of the carcass from which the meat is cut, and the quality of each carcass varies with the age and condition of the animal. The butcher deals with about a hundred cuts of meat, but the public are probably not familiar with more than half of these. Of those commonly known some are very much more in favour with consumers, either because they take less time and trouble to cook or because they are thought to have a better flavour.

GENERALLY the more tender and more highly priced cuts of meat are most popular, but the cheaper cuts which are less often favoured are equally nutritious and quite appetising if when they are cooked care is taken to add flavours and to cook them slowly to make them tender. Meat is a rich source of protein and phosphorus and a fair source of iron and the B group of vitamins. It commonly forms a large part of New Zealanders' daily diet, often being used in each of the three main meals for adults. For this reason the amount of household money spent on meat alone is comparatively large. With a knowledge of the various cuts of meat the housewife is better able to serve a variety of meat dishes and yet by judicious buying to avoid spending too much on meat to the detriment of other important foods.

Standards Laid Down

In order to protect the consumer, standards have been laid down by the New Zealand Standards Institute which enable the consumer to buy the meat best suited to the purpose for which it is intended.

These standards cover both the grading of the carcass and the naming of the cuts. All carcasses of stock killed for local consumption in abattoirs and meat export works must be graded and each grade carries the markings set out on page 462.

The standard cuts are defined in the diagrams on page 461 and 462. These specifications and markings act as a guide to enable the consumers to buy the cut and grade which best suit the requirements, according to the grading stripes and by definition of the standard cuts. Some of the standard cuts commonly sold are not shown on the diagrams. These are:—

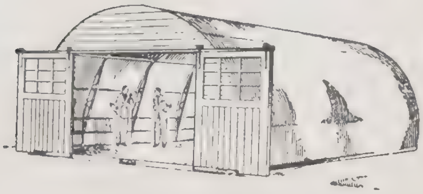
Veal cutlets: Chops cut from the loin.

Veal soup meat: Neck, legs, knuckle, and shins.

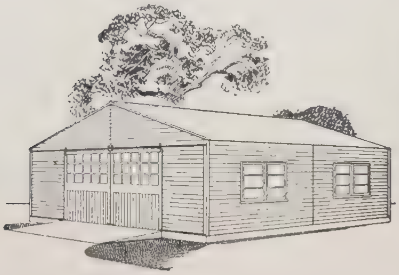
Beef roasts: Sirloin, prime ribs, back ribs, chuck ribs, top ribs, topside, and blade or bolar steak in the piece.

Cuts of meat which can be cooked by dry heat (left) and moist heat (right).

PREFABRICATED



SIZES: 16ft. wide x 24ft., 30ft., 36ft., 42ft., 48ft., etc.



Sizes: 8ft. x 8ft., 8ft. x 16ft., 8ft. x 24ft., etc. 10ft. x 10ft., 10ft. x 20ft., 10ft. x 30ft., etc. 20ft. x 20ft., 20ft. x 30ft., 20ft. x 40ft. etc.

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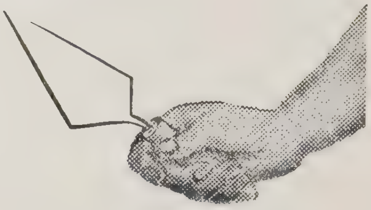

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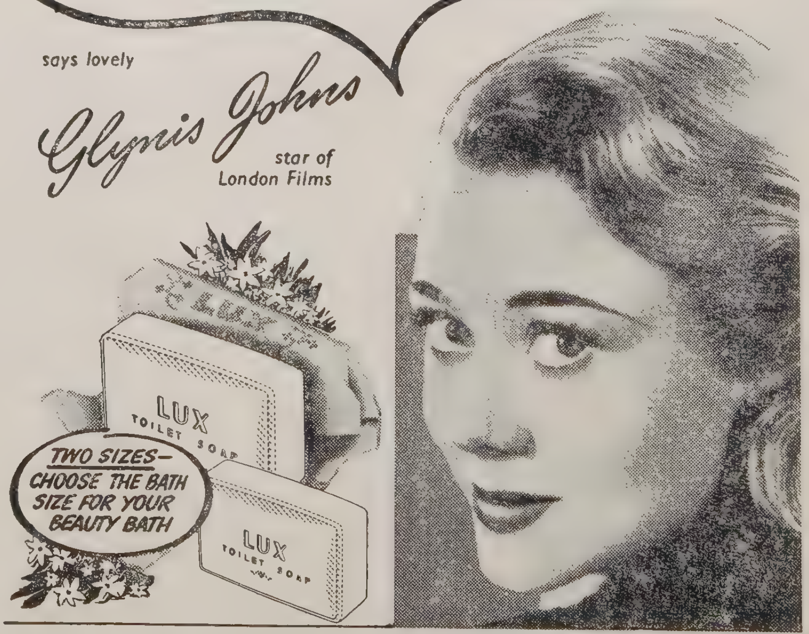
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Beef pot roasts: Fresh brisket (on the bone), chuck rolls, topside (in the piece), blade or bolar steak (in the piece), and top ribs.

(A rolled roast is merely one of the beef cuts which has been boned and rolled.)

Corned beef: Silverside, brisket, or any other cut which has been corned.

Grilling steak: Rump steak, fillet steak, undercut, and sirloin.

Frying steak: Topside, blade steak, thick flank, or top rump.

Stewing steak: Blade or bolar, chuck, thick flank, topside, and thin and thick skirt steaks.

Neck and breast of mutton: The inner and lower part of the forequarter, that is, what remains after the shoulder has been removed.

Spanish neck: The neck and half the forequarter.

French cutlets: Chops cut from the rib end of the loin with the top of the rib trimmed off.

Stewing chops: Cut from the neck or the forequarter.

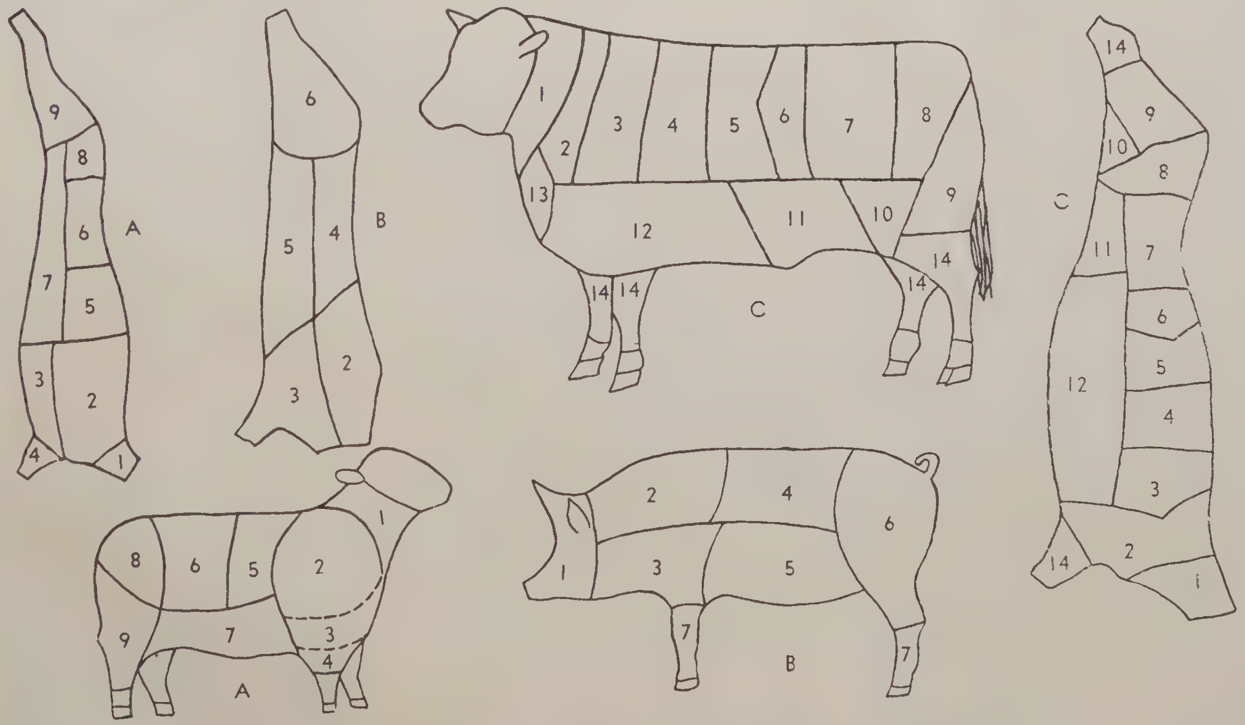
Two Types of Cooking

As meat is mainly muscle, the different cuts vary in tenderness according to the use the muscles have had in life. For this reason different methods of cooking are applied to different cuts of meat. Generally, there are two types of cooking:—

1. Moist heat.
2. Dry heat.

All the less tender cuts of meat should be cooked by the application of moist heat; the more tender ones may be cooked by dry heat, that is, grilling, frying, or roasting. A low temperature (not above 350 degrees) is considered desirable for all meat cooking, and should a high initial temperature be necessary to produce a particular flavour as in grilling, it should be lowered as soon as possible to prevent drying and loss of flavour. Cuts which may be cooked by dry heat include tender cuts of first and second grade carcasses, for example, the following.

Sundries which make appetising meals when suitably cooked.



A—Mutton, lamb, and hogget. 1. Neck. 2. Shoulder. 3. Breast. 4. Shank. 5. Rib loin. 6. Mid loin. 7. Flap. 8. Chump. 9. ½ leg. B—Pork. 1. Cheek. 2. Shoulder. 3. Hand. 4. Loin. 5. Belly or spring. 6. Leg or ham. 7. Trotters or feet. C—Beef. 1. Neck. 2. Chuck. 3. Blade. 4. Back ribs. 5. Prime ribs. 6. Wing ribs. 7. Sirloin. 8. Rump. 9. Silverside and topside (inside the leg). 10. Thick flank. 11. Thin flank. 12. Brisket. 13. Clod. 14. Shin.

Beef	Mutton, lamb, and hogget	Pork	Veal
Rump ..	Leg	Chops	Fillets
Fillet or undercut	Loin	Loin	Rump steak
Sirloin ..	Shoulder	Crown roast	Steak
Round ..	Loin chops	Leg	Cutlets
Prime ribs	Rib chops	Shoulder	Loin
Wing ribs	Chump chops		
Rolled ribs	Cutlets		

Cooking Times for Roasting

Beef: 20 to 25 minutes per lb. plus 20 minutes.

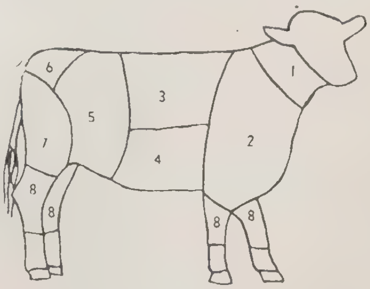
Mutton, lamb, and hogget: 15 minutes per lb. plus 20 minutes.

Pork: 30 minutes per lb. plus 30 minutes.

Veal: 15 minutes per lb. plus 15 minutes.

Cuts which have been boned and rolled need to be cooked for a longer time. Usually the cooking time added is 10 minutes per lb. All other cuts should be cooked with moist heat, that is, pot roasting, braising, stewing, boiling, in a casserole or pressure cooker. If meat is cooked in a pressure saucepan, it is essential to cook it for the necessary time only or it may become hard, dry, and flavourless because of the higher temperature used. However, it does save time and fuel when cooking less tender cuts of meat.

All corned meat should be cooked slowly by the application of moist heat. To prevent the meat being too salt the water should not be more than warm when the meat is put into it.



Cuts of veal—1. Neck. 2. Shoulder. 3. Rib. 4. Brisket. 5. Loin. 6. Rump. 7. Fillet 8. Knuckle.

Other parts of the carcass which are good eating but are not shown in the diagrams are ox-tails, tongues, sweetbreads, brains, kidneys, liver, tripe, and heart. These are generally best cooked slowly, but liver, kidneys, and brains may be fried. Of these liver and kidney are the most nutritious and liver should be included in the menu at least once a fortnight. Mincemeat and the various sausages are prepared from carcass trimmings or from small pieces left when certain joints are cut.

GRADE MARKINGS OF CARCASSES FOR LOCAL CONSUMPTION

Class of Meat	Grade	No. of Stripes	Colour
Veal ..	First	1	Red
	Second	1	Violet
	Boner	2	Chocolate
Beef ..	First	1	Red
	Second	1	Violet
	Third	1	Yellow
Pork ..	First	1	Red
	Second	1	Violet
	Boner	2	Chocolate
Lamb ..	First	1	Red
	Second	1	Violet
(For lamb only, the grading stripes are an interrupted line to distinguish lamb from first-grade mutton)			
Hogget ..	First	2	Red
Mutton ..	First	1	Red
	Second	1	Violet
	Third	1	Yellow
	Boner	2	Chocolate

Brawns are also prepared from the trimmings and in the case of pork brawn from the cheek.

Enhancing Flavour

The flavour of most cooked meats is enhanced by serving with them a food or a sauce of contrasting flavour and texture. Suitable accompaniments for the various cuts of meat are as follows:—

Roast beef (hot): Yorkshire pudding, horse-radish sauce. Cold: Tomato sauce or any pickle.

Corned beef (hot): Mustard or mustard sauce. Cold: Mustard or relish.

Roast veal (hot): Rice, mushroom, or onion sauce. Cold: Any pickle or relish.

Roast pork: Apple sauce, raw pineapple, or an acid sauce. Cold: Mustard or relish.

Corned pork: Mustard or any acid sauce.

Roast mutton (hot): Mint sauce or mint jelly. Cold: Red currant jelly or mint sauce or jelly.

Boiled mutton (hot): Caper, parsley, or onion sauce. Cold: Red currant jelly, mint jelly.

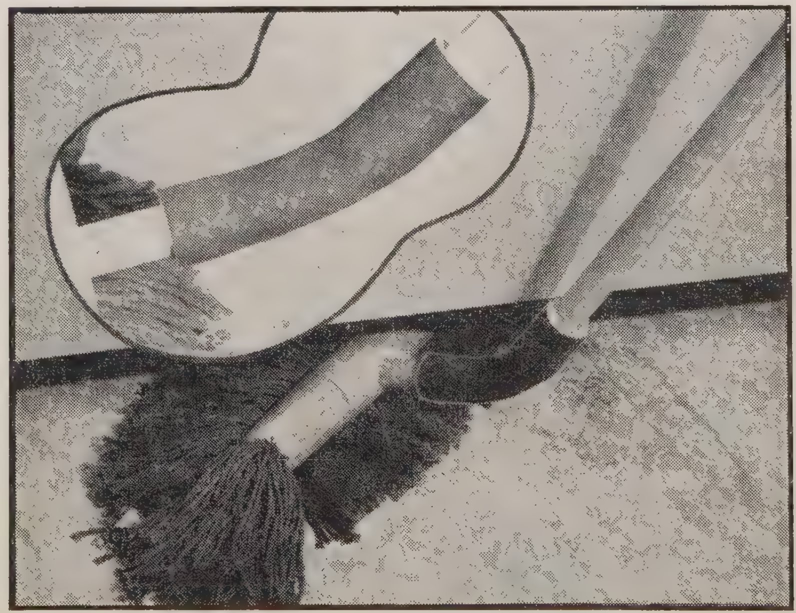
Grilled or fried steak: Raw tomatoes, fried onions, Worcestershire sauce.

Grilled or fried chops: Raw or fried tomatoes, tomato sauce, mint sauce.

Corned tongue (hot): Mustard, tomato sauce, parsley sauce. Cold: Any pickles.

All photographs by Sparrow Industrial Pictures Ltd.

Adapting a Mop to Clean under Low Furniture



A SIMPLE way in which a mop can be adapted for cleaning under low furniture is to cut the mop handle about 1in. from the mop head and join the two pieces of the handle with a short length of rubber hose. The flexible hose allows the handle to bend so that the mop will reach under low furniture. The illustration shows the mop in use and inset is the mop handle with the hose inserted in position near the head.

—*EDITH G. McNAB, Rural Sociologist,*
Department of Agriculture, Timaru

"FOOD AND HEALTH"

"National good health is an ideal still far from being achieved in New Zealand, as elsewhere", writes Evelyn E. Moore, one of the Department of Agriculture's Rural Sociologists, in the opening chapter of a new publication, "Food and Health". ". . . In the long run the responsibility for improving the national health lies with New Zealand housewives and mothers. . . . This bulletin has been produced in the hope that it will enable her to correct some of the errors in her family's diet, most of which occur unwittingly."

In 88 brightly written and well-illustrated pages Miss Moore, who is a frequent contributor to "The Journal of Agriculture", has made a wide cover of her subject, including many little-known facts and aspects, and the material is presented in a manner which makes for ease of reading and appreciation of the force of her arguments.

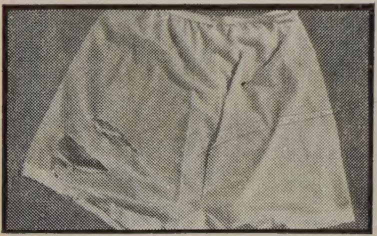
Bulletin 338, "Food and Health", is obtainable from any main office of the Department of Agriculture for 1s. 6d. post free.

UNTIL now the word "nylons" has been synonymous with stockings in New Zealand, for that material has revolutionised the hosiery trade, but nylon is beginning to invade other markets. To take full advantage of these new fabrics it is essential to know their advantages and limitations compared with those of the accepted fibres. The properties of nylon, the technique of sewing it, and other features of the new fibre are the subject of this article by Helen Paine, Rural Sociologist, Department of Agriculture, Wellington.

WHEN nylon is compared with other fibres two qualities stand out as special attributes—great strength and lightness. The fact that the material absorbs little water and so dries very readily is also an asset, and dried nylon fabric needs little or no ironing. All these properties make nylon clothes ideal for the traveller's wardrobe. Whether journeying on business or for a holiday, no woman—or man, for that matter—wants to spend time worrying about washing and ironing if it can be avoided. Nylon is the solution. With nylon underclothing it is not necessary to pack and carry a change of clothes, because after a rinse through every night they can be worn again the next day, clean, dry, and creaseless.

Precautions with Nylon

However, nylon must be treated with respect. There are certain things that must not happen to a nylon fabric and precautions that must be taken if a garment is to give lasting service. The following recommendations should be carefully observed when buying, sewing, and using nylon materials:—



Nylon material damaged by the use of too hot an iron.

Use sharp needles, pins, and scissors.

Sew with medium-large stitches and loose tension.

Try to use nylon thread, slide fasteners, binding, and lace, for most of these are now on the market at reasonable prices.

Sew with double seams. Flat fell or french seams are the most suitable; otherwise the material must be stitched back, because it tends to fray.

Edge collars and cuffs with stitching. This keeps the edges neat after the garment has been washed.

Do not buy nylon fabric off the bolt if it has been creased, because the crease will never come out.

Do not tear nylon or it will fray very badly, wasting a lot of material.

Do not break nylon thread or it will stretch. Always cut it with a pair of scissors.

Do not send nylon to be dry cleaned without stating its nylon content.

Washing and Ironing

Special care must be taken when nylon is washed or ironed, but if these instructions are followed, any nylon garment will wear for years:—

Wash a nylon garment in lukewarm water with neutral soap flakes and rinse it twice in luke-warm water. Roll it up in a towel so that the greater part of the moisture is absorbed, then hang it on a coat-hanger or spread it out by any similar means to dry. Do not dry a nylon garment near the direct heat of a radiator or fire or in strong sunshine.

If a nylon garment must be ironed, use a very cool iron or a steam iron and be very careful.

A variety of nylon materials is illustrated with this article, and an even greater range is produced in England and America. The fabrics which are easily procurable in New Zealand are:—

Nylon tricot: A lightweight sheer material suitable for underwear. It looks very delicate, yet is hard wearing and durable. Modern techniques are producing a variety of weaves, some with a net-like appearance and others lacy.

Sheer nylon: A lightweight fabric of a plain weave which, like the tricot, could be used for underclothing. It is available in plain colours, mostly pastel shades, and in a variety of floral designs.

Heavyweight nylon: A material suitable for blouses, shirts, children's smocks, and similar garments. It is not as sheer as the lightweight nylon, but has all its desirable properties.

Few of the luxury nylon materials are obtainable in New Zealand, and those that are in the shops are very expensive, but the most interesting of these new fabrics are worth listing because they will be available some day, and by then they may even be cheaper than the fabrics made from natural fibres.

Nylon marquisettes are made in glorious colours and are suitable for evening wear.

Nylon and worsted mixtures, which give a lightweight cloth, are made by reinforcing the worsted thread with nylon filament.

Nylon suede has a smooth, soil-resisting finish and easy-washing, quick-drying properties which make it ideal for light-coloured summer gloves.

Nylon and wool mixtures make the perfect sock, having all the advantages of a wool sock with the added quality of nylon.

Nylon velvets and shantung materials are among the many other fabrics being produced, some still in the experimental stages. They are rich, glossy, and uncrushable, with a remarkable resilience to wear.

Furnishing fabrics: Nylon marquisette, for curtains, and heavy printed nylons are both suitable for furnishing fabrics.

These new materials have drawbacks, but manufacturers are rapidly overcoming the most serious of them.

Nylon socks which withstood 2 years' use without a hole being worn.

A nylon shirt can be washed easily, will dry in an hour hung on a coat-hanger, and needs no ironing.

The main disadvantage of nylon was its coldness to the touch, caused by the smoothness of the surface, but matt and ruffled surfaces remedy this defect. The material does not absorb perspiration (though open and mesh weaves counteract this), but that is quite unavoidable, as one of its chief advantages is its ease of washing and quickness of drying.

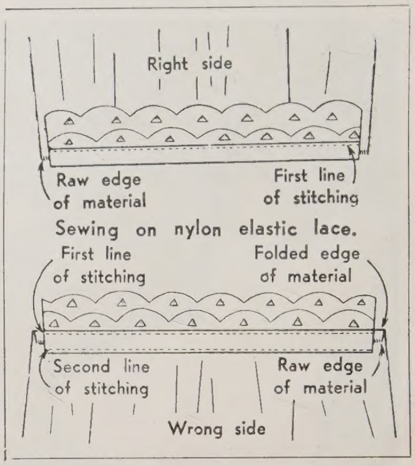
Of the new nylon accessory materials on the market, laces, elastics, ribbons, and bindings are among the most useful. The strength of the fibre makes it suitable for ribbons and bindings where durability is essential, and its lightness makes it suitable for laces.

Nylon Elastic Lace

A new speciality in nylon is an elastic lace which can be used for many purposes. There are two varieties. One that is wide and strong can replace ordinary elastic in nylon garments, its chief use being in brassieres and on the tops of panties. The narrower lacy variety of nylon elastic has a special value where ordinary elastic has too much constriction, as it can be drawn in without discomfort; at the neck and cuffs and even at the waist of a nightgown it can be used instead of ribbons and cords. These elastic laces can be used with fabrics other than nylon.

Nylon elastic should be sewn on by hand, though the work can be managed by machine if sufficient care is taken. Both types of lace consist of two bands, an open lacy band and a closely woven band which is sewn on to the garment. Following is the method:—

With the right sides of the material and elastic facing each other, place the materials so that the elastic extends just beyond the raw edge, as in the upper diagram. With the elastic fully stretched, stitch at the junction of the two bands on the elastic (along the dotted line in the diagram). Turn the elastic up and its edge should cover the raw edge of the material on the wrong side. Finally turn to the wrong side and, still holding it stretched, stitch the lower edge of the elastic to the material, as in the lower diagram.



Sewing on nylon elastic lace.

Shirts and Children's Clothes

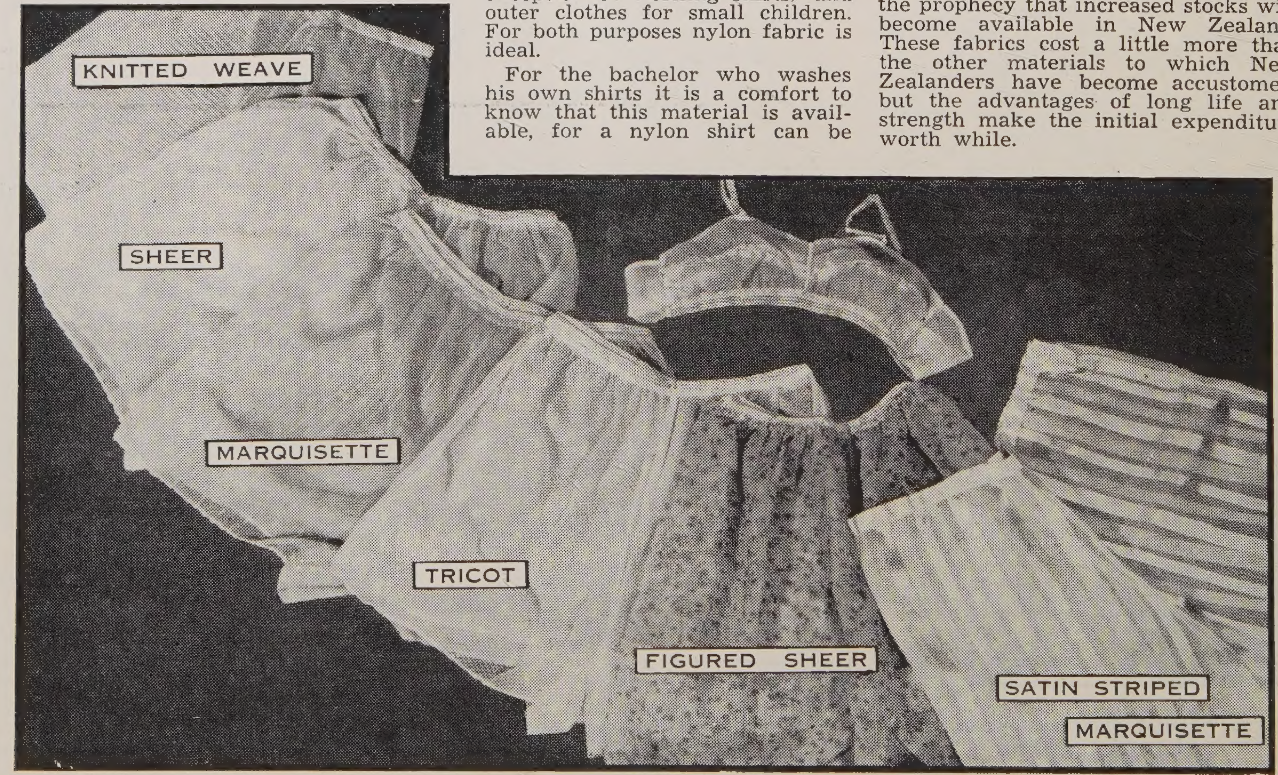
Two special uses for which nylon has recently become popular are in the making of men's shirts (with the exception of working shirts) and outer clothes for small children. For both purposes nylon fabric is ideal.

For the bachelor who washes his own shirts it is a comfort to know that this material is available, for a nylon shirt can be cleaned easily, then hung on a coat-hanger and dried in an hour, and needs no ironing. Even if the shirt is a little creased, these lines will come out after it has been worn for a few minutes. For the traveller nylon shirts are a great space saver, as they are lighter than other shirts and fewer of them are needed.

Nylon clothes for children have some obvious advantages. The material is tough, yet looks light; the clothes are pretty, yet can be laundered easily. Nylon is not suitable for the underclothes of young children, as it does not absorb moisture readily and the clothes may tend to become damp, especially on a very active child.

Wider Use Likely

At present the buying or making of nylon clothes depends largely on what is available, but the popularity of this material overseas is sufficient to justify the prophecy that increased stocks will become available in New Zealand. These fabrics cost a little more than the other materials to which New Zealanders have become accustomed, but the advantages of long life and strength make the initial expenditure worth while.



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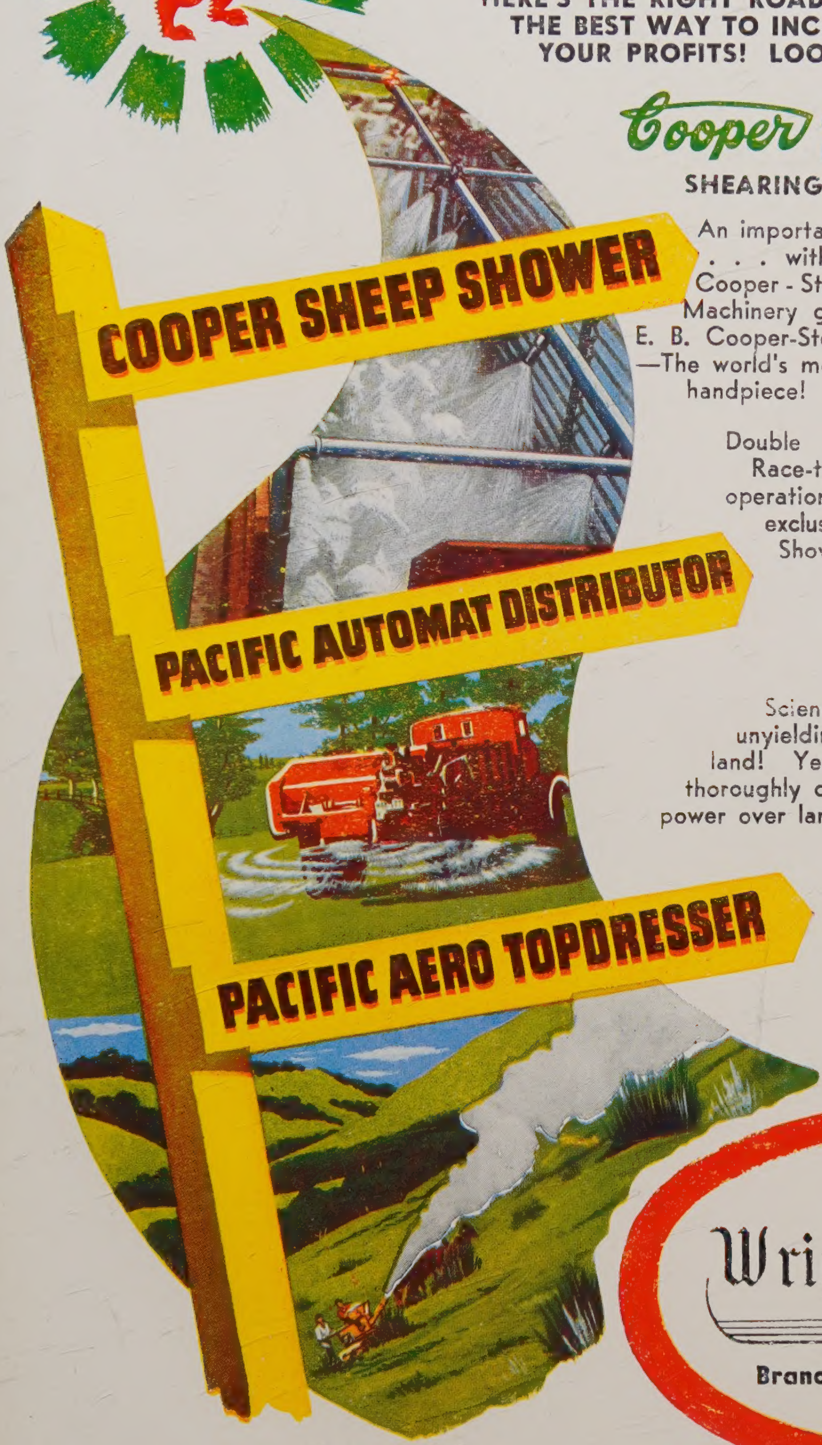

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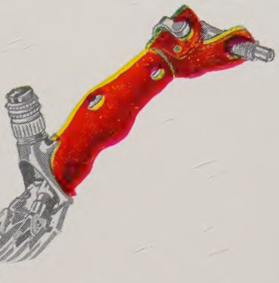

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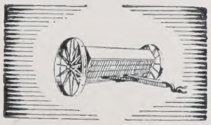

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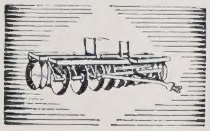

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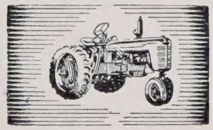

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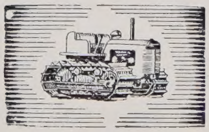

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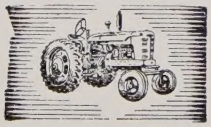

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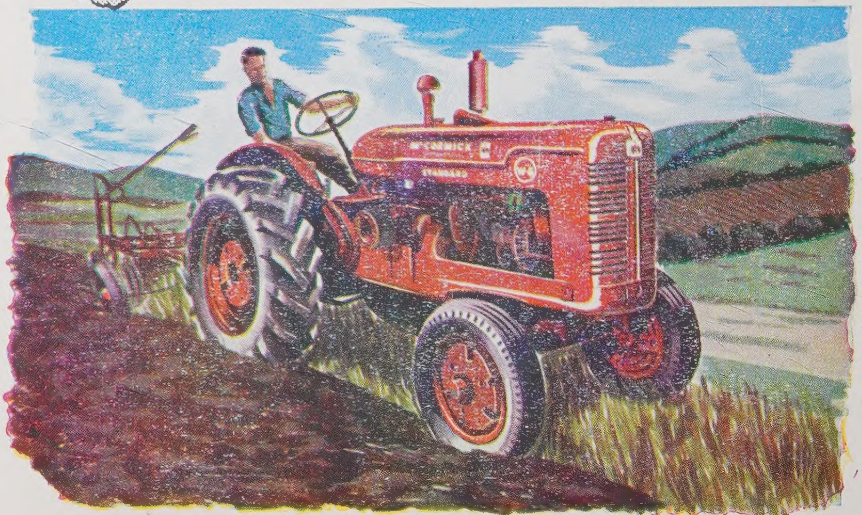

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